INDUSTRIAL HYGIENE SAMPLING GUIDE FOR CONSOLIDATED INDUSTRIAL HYGIENE LABORATORIES

Prepared by

NAVY ENVIRONMENTAL HEALTH CENTER
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SEPTEMBER 1996

Reviewed and approved by

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CAPTAIN R. L. BUCK, MC, USN
Commanding Officer

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INDUSTRIAL HYGIENE SAMPLING GUIDE FOR CONSOLIDATED INDUSTRIAL HYGIENE LABORATORIES

INTRODUCTION

This guide contains a compilation of sampling and analytical method recommendations for specific chemicals which the Navy has in-house analytical capability through its three Consolidated Industrial Hygiene Laboratories (CIHLs) located at the Navy Environmental and Preventive Medicine Unit Two (NAVENPVNTMEDU TWO), Norfolk, VA; NAVENPVNTMEDU FIVE, San Diego, CA and NAVENPVNTMEDU SIX, Pearl Harbor, HI. This guide is a concise reference for the industrial hygienist in the proper submission of industrial hygiene, environmental, bulk and biological samples. This guide lists the analyte or substance, the Chemical Abstracts Service Registry Number (CAS #) for the substance, analytical method used by the laboratory in performing the analysis, method's coefficient of variation (CV), limit of detection (LOD), sampling media, recommended air volume, sampling rate, special instructions for the industrial hygienist submitting the sample, and location of laboratory which can analyze the sample. Customers should submit samples to the laboratory located nearest them or most convenient to them. If that laboratory does not have the analytical capability, call the laboratory to verify this fact and choose a laboratory which provides the required service. Since all laboratories are constantly updating their analytical services, always check with the closest laboratory first.

Each CIHL welcomes comments and suggestions regarding its services, additional method development requirements, alternate sampling techniques, and any other input. All questions regarding laboratory service/capability should be addressed to the CIHL which provides the service. Working hours are generally 0730 to 1600 hours Monday through Friday. If the CIHL can't be reached or additional information is required, please call the NAVENPVNTMEDU to which the laboratory reports. All comments concerning the CIHL program management, additions, corrections and changes to this guide, should be addressed to:

Commanding Officer
Attn: CIHL Program Manager
Navy Environmental Health Center
2510 Walmer Avenue
Norfolk, VA 23513-2617
Tel: (757) 363-5526
DSN: 864-5526
FAX: (757) 445-7330

LABORATORY ORGANIZATION

BUMEDINST 5450.157, dated 15 June 92, published the functions and tasks of the Navy Environmental Health Center (NAVENVIRHLTHCEN) and its subordinate commands. The mission of the NAVENVIRHLTHCEN, to coordinate and provide centralized support and services to medical activities, afloat and ashore, in areas of occupational health, lead to the formation of the CIHL program. BUMEDINST 5450.157 requires the NAVENPVNTMEDUs to provide, through the CIHLs, specialized qualitative and quantitative analyses of samples to support occupational health and industrial hygiene investigations and assessments.

On 1 October 1989, all Consolidated Industrial Hygiene Laboratories became Departments within the Navy Environmental Health Center's Echelon IV commands. The following information for the three CIHLS is provided:

1- Officer In Charge
Navy Environmental PreventiveMedicine Unit Five (NAVENPVNTMEDU FIVE)
Consolidated Industrial Hygiene Laboratory (CIHL)
NAS North Island, Bldg 14, Wing 4
San Diego, CA 92135-5153

Mr. Charles Kubrock, Director of Laboratory
Phone: (619) 545-4315/4296; DSN: 526-4315/4296
FAX: (619) 545-4270

NAVENPVNTMEDU FIVE Phone: (619) 556-7070
DSN: 526-7070 FAX: (619) 556-7071

2- Officer In Charge
Navy Environmental Preventive Medicine Unit Six (NAVENPVNTMEDU SIX)
Consolidated Industrial Hygiene Laboratory (CIHL)
Pearl Harbor Naval Shipyard
P.O. Box 112, Bldg 1750
Pearl Harbor, HI 96860-5040

Dr. Roy M. Ishikawa, CIH, Director of Laboratory
Phone: (808) 474-4428; DSN: 474-4428
FAX: (808) 474-2071

NAVENPVNTMEDU SIX Phone: (808) 471-9505
DSN: 471-9505 FAX: (808) 474-9361

3- Officer In Charge
Navy Environmental Preventive Medicine Unit Two (NAVENPVNTMEDU TWO)
Consolidated Industrial Hygiene Laboratory (CIHL)
1887 Powhatan Street
Norfolk, VA 23511-3394

Mr. George Lindsay, CIH, Director of Laboratory
Phone: (757) 444-7671; DSN: 564-7671
FAX: (757) 444-1191

NAVENPVNTMEDU TWO Phone: (Same as lab)

GENERAL POLICY

The CIHLs provide analytical support services for samples submitted through the BUMED Industrial Hygiene Offices. The analytical services available at the laboratories are primarily designed for quantitative analyses of occupational health samples and selective environmental samples.

SPECIFIC POLICIES

POLICY ON STANDARD OPERATING PROCEDURES AND LOCAL OPERATING PROCEDURES

Standardization among the laboratories is an essential part of the CIHL programs . A document of Standard Operating Procedures (SOPs), dated June 93, issues quality guidance for the operation and standardization among the CIHLs. Based on this document each CIHL developed its own Local Operating Procedures (LOPs). The LOP (which implements instructions and any laboratory procedural changes) maintains current procedures in use at each laboratory. Historical records are kept of the dates when procedures are implemented and taken out of service.

POLICY ON SAMPLE ACCEPTANCE/REJECTION

Sample submissions, accompanied by the completion of Form NEHC 5100/13 (Note: every information category must be completed) by the industrial hygienist, properly preserved as appropriate, and shipped by the proper method (See Sample Packaging and Shipping Requirements Section) will be accepted by the CIHL and analyzed as routine unless the submission is noted "URGENT". Urgent sample must arrive by a one or two day courier service.

If samples are taken incorrectly and/or incomplete paperwork are received, every effort will be made to secure the necessary information to convert the invalid sample into a valid sample. Samples will only be returned to the client when requested by the client. Paperwork may be returned for correct completion, however the samples will remain at the laboratory. In order to assure a quick laboratory turnaround time, please assure samples are taken according to this guide, shipped appropriately, and the Form 5100/13 is correct and complete.

When samples are received and are not able to be corrected for validity (e.g., fiber counts submitted on PVC filters), the client will be notified by phone, fax or letter in order to determine the disposition of the sample. These samples will be returned to the customer upon the request of the customer.

POLICY ON ANALYTICAL METHODS

Rarely are analytical methods either complete or fully comprehensive to preclude some interpretation, change or modification of the method. NOTE: This is the reason for the CIHL requirement that a LOP manual be available at each CIHL. Most methods are single analyte methods while most samples are multiple contaminants. Most analytical methods used by the CIHLs are taken from the National Institute for Occupational Health (NIOSH) or the Occupational Safety and Health Administration (OSHA) methods. Since OSHA does not required specific analytical methods, unless stated in stressor-specific standards, any method (e.g., ASTM, literature citings, journal articles, etc.) can be used as long as it meets NIOSH criteria of accuracy within 25% at the 95% confidence level. All NIOSH and OSHA methods in this document are "modified methods". The modification is necessary because of the variance in: analytical columns (types, sizes); desorbing agents; digesting acids/bases; analytical equipment conditions (temperatures, pressures, flow rates). All these modified methods are evaluated and validated for the NIOSH accuracy of 25% at the 95% confidence level by each CIHL, and the method changes are documented as modifications.

POLICY ON COEFFICIENTS OF VARIATIONS

Randomly distributed errors occurring in industrial hygiene sampling are normal and are commonly included in analytical reports by the use of the coefficient of variation (CV). The CV is a useful index of differentiating the true mean of known data points and laboratory reported data. The total CV of the sampling and analytical method is based on a statistical standard normal deviation for 95% two-sided confidence limits. The statistical decision techniques developed by NIOSH and OSHA are implemented in the Navy's use of the CVs. Therefore since the industrial hygienists will seldom receive true exposure results from the labs due to sampling and analytical

fluctuations, the CVs for each analyte are reported in the tables so 95% confidence levels may be calculated. Our CIHLs are capable of reporting the same or lower CVs annotated in the official analytical method (the values of which are noted in the Laboratory Sampling Guide Table).

For Time Weighted Average (TWA) sampling, the CV criteria originally adopted by NIOSH of ± 25% accuracy, with 95% confidence limits, is usually cited, but accuracy specifications may vary from one standard to the next. Substances which have Permissible Exposure Levels (PELs), but for which no specific standard has been promulgated, do not have specific accuracy requirements. For these substances, the labs consider the method acceptable (e.g., OSHA, NIOSH, literature cited methods) if it can meet the 25% accuracy requirement with 95% confidence.

POLICY ON ANALYTICAL RESULTS

The CIHLs are reporting air samples results in "total weight per sample" because of the confusion in the interpretation when samples are reported in mg/M^3 (Some clients are using this value as the TWA when the sample did not represent an eight hour exposure.) Blanks submitted with the samples are also reported in "total weight per sample". The CIHL will notify the client when the blank values are elevated more than normal. It is now the responsibility of the client to take the analytical results and compute TWAs as necessary. If you need assistance, please contact your local industrial hygienist or the CIHL.

POLICY ON LIMIT OF DETECTION

It is not unusual for the Limit of Detection (LOD) of an analyte to vary from day to day. Instrumental conditions and environments vary day to day and this variation often effects the LOD. If you envision detection levels (e.g., a short duration sample) to be a problem, please contact the CIHL performing the analyses. Often the laboratory can modify a method to increase the sensitivity and selectivity; however, the analyst must know your requirements before the performance of the analyses using the standard analytical method.

POLICY ON SPIKED SAMPLES/FIELD SUBMITTED QC SAMPLES

The CIHLs are required by their accreditations through the American Industrial Hygiene Association (AIHA) to have a comprehensive quality control (QC) program which involves, at a minimum: A written QC plan, a designated Quality Control Coordinator (QCC) responsible for the QC program, participation in the Proficiency Analytical Testing (PAT) program for all categories of analytes performed for the client, records which demonstrate the routine introduction of control samples of known content along with samples for analysis, records which demonstrate routine checks, calibrations, maintenance of equipment and instruments are performed to ensure adequate performance, quality control data stored in an accessible manner, routine checks made of procedures and reagents, and interlaboratory, as well as intralaboratory QC.

Occasionally the client may feel uncomfortable with laboratory results and thereby "test" the QC program of the laboratory by administering blind QC samples to the laboratory. The only recommended method of testing the laboratory is purchasing past PAT rounds from the AIHA and submitting these as controlled spikes. Literature articles have proven that side by side duplicate monitoring very rarely produces duplicate samples. The use of a duplicate sampling manifold will not produce duplicate samples; however this method of sampling is superior to the use of two independent sampling systems side by side. Contact the AIHA (phone number (703) 849-8888 or FAX (703) 207-3561) for the purchase of PAT metals, solvents, fibers and free silica. PLEASE NOTIFY THE LABORATORY ONCE YOU RECEIVE THE RESULTS OF YOUR QC SAMPLE SO THE LABORATORY MAY DOCUMENT ITS QUALITY CONTROL PROGRAM TO INCLUDE THIS BLIND QC SAMPLE. THIS SAMPLE WILL BE IDENTIFIED AS A TRUE QC BLIND. Also the laboratory will remove the results of this sample from the Database if you have identified the sample as a field sample (e.g., assigned "fake" breathing zone sample information).

Please realize that if there is a quality problem with the CIHLs, the labs want to be the first to know so they can find and resolve the problem. The labs welcome and expect feedback from the clients.

POLICY ON BLANK MEDIA

NIOSH recommends and it is the CIHLs' policy that: 1) field blanks* should be treated like field samples (corrected for reagent blanks**, media blanks*** and recovery) and 2) sample concentration correction from contaminated field blanks be performed by the person submitting the sample, and NOT THE LABORATORY. (This NIOSH recommendation directed the CIHLs to report all samples and blanks in total contaminants per sample). It is the responsibility of the client (with assistance from the laboratory) to determine what constitutes a contaminated field blank, whether the field blank should be subtracted from the associated sample and whether the sample result should be accepted as valid.

* Field blanks measure the signal contribution of the media plus any contamination which may have occurred during handling, shipping and storage before analysis. Field blanks are taken into the field (workplace), opened and treated just like the field samples except no air is drawn through them.

** Reagent blanks are virgin sampling media that have not been in the workplace.

*** Media blanks measure the signal contribution from the collection media (e.g., the filter, sorbent tube, the impinger solution, etc.)

The nature and number of blank measurements will depend on the method and circumstances. The purpose of all blank measurements is to help prevent errors in identification and quantifying the field samples.

Other CIHL policies on blanks include:

1. All requests for sample analysis will require a minimum of one field blank when OSHA sampling and analytical methods are used, or a minimum of two field blanks when NIOSH sampling and analytical methods are used.

2. When multiple requests from the same source and for the same type of analysis (e.g., metals, benzene, Cr VI, etc.) with multiple corresponding blanks are submitted, the laboratory will analyze and report each sample and each blank submitted.

3. Blanks are analyzed as samples and reported as amount of analyte per sample (e.g., 2 milligrams Cd per filter) or as less than the limit of detection (i.e., <LOD). The LOD appears on the report and will be equal to, or approximately equal to, the analytical method's LOD (See column LOD in the Lab Sampling Guide). It is not unusual for the Limit of Detection (LOD) of an analyte to vary from day to day. Instrumental conditions and environments vary day to day and this variation often effects the LOD. If you envision problems with published detection levels (e.g., a short duration sample), please contact the CIHL performing the analyses. Often the laboratory can modify a method to increase sensitivity or slectivity; however, the analyst must know your requirements before the performance of the analyses using the standard analytical methods.

4. In your computation of sample results, sample values are corrected by subtracting the blank value (or average of blank values when more than one blank is submitted) from each sample value.

5. High blanks - Definition. The majority of blanks for gas chromatographic analyses and metal analyses yield values that are below the LOD for the chosen analyte. For those analytes any blank value which exceeds the LOD can be considered "high". For certain metals (e.g., Fe and Zn), solvents (e.g., benzene) and other analytes (e.g., sulfate) the blank values may exceed the LOD. For these analytes, the lab calculates the mean and the standard deviation of ten or more blanks previously analyzed and uses the mean plus 3 times the standard deviation as the control limit. Any blank which exceeds this control limit will be considered "high". The CIHL will inform you when high blanks are encountered. NOTE: The AIHA considers high blank values to be samples where the reported value (e.g., x micrograms) divided by the volume of sample collected (e.g., y liters) exceeds one tenth the PEL. This type of contamination may occur in manufacturing or handling of the samples. If possible, additional blanks should be analyzed to ensure sampling medium lot integrity. The industrial hygienist should work closely with the chemists in the CIHLs to determine the source of contaminations and to determine whether it is constant. One approach is to decide whether all the samples collected are contaminated equally. If there is a consistent source of contamination, the sample results should be at or above the blank level. If there is no consistency, some unexplained phenomenon has occurred, and the blank should not be subtracted from the analytical results. Bear in mind that subtracting the blank may reduce sample

results to lower than what is truly in the workplace. It is generally preferable to be conservative by slightly overestimating the exposures rather than underestimating. It may be useful for the industrial hygienist to prepare control charts for blank values for each type of sample (e.g., lead, zinc, toluene, etc.) in order to determine an acceptable blank value range.

POLICY ON USE OF DISCLAIMERS

The CIHLs recognize field situations when samples cannot be taken according to required sampling methods (e.g., "a once in a lifetime opportunity sample"). In such cases, the laboratory will usually analyze the sample if taken on an appropriate sampling medium, and report a result accompanied by a disclaimer STAMP. The more common disclaimers on the stamp are:

1- INSUFFICIENT AIR VOLUME-The air volume is less than the amount recommended for this method. Consequently the coefficient of variation (CV) published for the method may not apply. Professional judgement should be used with the interpretation of results.

2- QUESTIONABLE FLOW RATE-The flow rate differs from the recommended method's rate. Therefore, professional judgement should be used in the interpretation of results.

3- INCORRECT SAMPLING MEDIUM-The sample media is not one currently recommended by NIOSH, OSHA or the latest edition of NAVENVIRHLTHCEN's Industrial Hygiene Sampling Guide for CIHLs. Therefore, professional judgment must be used in the interpretation of results.

4- NON-NIOSH/NON-OSHA METHOD-The analytical method is not one currently recommended by NIOSH, OSHA or the latest edition of NAVENVIRHLTHCEN's Industrial Hygiene Sampling Guide for CIHLs. Therefore, professional judgment must be used in the interpretation of results.

5- SHIPPING ERROR-Bulk samples were received in the same shipping package as air samples for the same contaminant. Samples were not preserved or did not arrive at the laboratory within the recommended shipping time. Therefore, professional judgment must be used in the interpretation of results.

6- BLANK(S) NOT SUBMITTED-As required by the sampling and analytical method. Therefore, professional judgment must be used in the interpretation of results.

7- OTHER-(Other laboratory specific comments requiring a disclaimer.)

QUALITY ASSURANCE (QA)

The three CIHLs are accredited by the American Industrial Hygiene Association (AIHA) which requires participation in all applicable round robin testing programs. The AIHA accreditation program specifies operational guidelines for maintaining satisfactory performance, including qualified personnel, proficiency analytical testing, adequate facilities, quality controls, equipment maintenance, documentation and site audits. In addition to this accreditation program, all laboratories participate in several quality control programs for monitoring daily performance. Both internal and external quality control samples are analyzed to assure accuracy and precision of results. Some of the QA techniques used include replicate analyses, recycles, spiked controls, commercial reference controls, daily instrument calibration, control charts, regression analyses, data review, reagent and media blanks. Each laboratory maintains its own quality control manual, which gives extensive description of the quality assurance program. Please address specific QA questions to the CIHL performing the analytical work.

LAB ANALYTICAL EQUIPMENT

The primary analytical instrumentation in each laboratory consists of gas chromatographs, atomic absorption spectrophotometers (both flame and graphite furnace technologies), ultraviolet/visible spectrophotometers, infrared spectrophotometers, high performance liquid chromatographs, ion specific electrode meters, ion chromatographs, microbalances and microscopes (both phase and polarizing). Inductive coupled plasma (ICP) spectrometers, gas chromatograph/mass spectrophotometer, and an X-Ray Diffractometer are located at various labs. (See page 9 for applications and locations.)

SUBMISSION REQUIREMENTS

SAMPLE SUBMISSION FORM

Air, bulk, and wipe samples must be submitted on Navy Environmental Health Center Form NEHC 5100/13 (REV 12/95) (See pages 15 thru 17 and Appendix A of this Guide.) Copies of this form and instructions for completion are also provided in the Industrial Hygiene Field Operations Manual, NEHC-TM, Appendix 3-A.

BIOLOGICAL SAMPLES

Biological samples must be submitted with an accompanying sample submission documentation, preferably a transmittal list containing:

1- Name of medical facility submitting samples
2- Name of person submitting samples

3- Date of submission

4- Name of person sampled (i.e. patient)

5- Sample number [Last four digits of the social security number (SSN) of the patient (or complete SSN). For example the sample number for J. Doe with SSN of 123-45-6789 might be #Doe6789.

6- Age of person sampled (required for blood lead samples only)

7- Date sample was collected

8- Name of test requested.

9- Occupational code of patient

10- Patient's command UIC.

Because most medical treatment facilities use a computerized system for medical records, biological samples submitted for blood lead/ZPP and urine mercury may be submitted with a computerized transmittal list. Please refer to section below entitled "ROUTINE BIOLOGICAL SAMPLES" for specific guidance on this transmittal list.

Biological samples for blood lead/ZPP and urine mercury may be submitted on Standard Form 557 (miscellaneous Chemistry Chit). The request must be signed and dated by the submitting MD, RN or PA.

All biological samples must be properly packaged and labeled in accordance with Navy, Federal, State and local regulations. It is recommended a commercial express package delivery service be used to transport samples to the CIHL. Please contact the carrier for their shipping and labeling requirements. In general, the samples must be placed in a sealed, waterproof primary container that contains absorbent material sufficient to absorb all possible leakage. The primary container must then be placed in a sealed, secondary container. The secondary container can then be placed in an outer container for shipment. All containers should be adequately cushioned so the samples do not become loose and move during shipment. Freezer packs should be used to keep the samples cold. Do not use ice, and do not freeze the samples. An Etiological Agent/Biomedical Material label must be affixed to the outside of the outer shipping container.

When samples are sent by U.S. Postal Service (USPS), Express Mail Delivery is required. Each package of samples using USPS cannot contain more than a total of 50 milliliters (1.7 ounces) of sample. If more than 50 milliliters of samples (e.g., approximately 7 blood lead samples) are sent to the lab, consider using a commercial express package delivery service. For more information on the shipment of samples, consult U.S. Postal Service Publication 52 entitled "Acceptance of Hazardous, Restricted, or Perishable Material" dated April 1990 and NAVSUPINST 4610.31A entitled "Preparation of Medical Material Requiring Freeze or Chill Environment for Shipment."

SAMPLING REQUIREMENTS

Always review the preferred method of sampling given in this guide and amplified by the appropriate analytical method (e.g., NIOSH or OSHA analytical method manuals, etc.). If the recommendation cannot be followed, contact the laboratory prior to sampling for additional guidance.

The recommended air volumes provided in this guide are usually a range of volumes, with the higher value recommended in the majority of sampling. The lower air volume should only be used when: 1) the exposure may be at an unsafe/unhealthful exposure level such as an exposure exceeding the Time Weighted Average (TWA) value given in the Occupational Safety and Health's Final Rule Limits, 2) the application of a Short Term Exposure Limit (STEL) or a Ceiling value is applicable to the substance, and 3) the operation limits

the amount of sampling time. As a general rule, the recommended sampling volumes will allow a detection limit of 10-50% of the TWA.

SAMPLE PACKAGING AND SHIPPING REQUIREMENTS

(See Biological Samples Section for requirements on shipping.)

1. Small sample media such as sorbent tubes and filter cassettes should be bound together (i.e., rubber band) or placed in plastic bags to reduce the possibility of being overlooked or discarded. Sample cassettes and sorbent tubes should NOT be wrapped in tape. Simply affix a legible sample submission number (preferably a preprinted label) to the sample and neatly package it to avoid shipping damage. Never ship air samples and bulk samples in the same shipping package.

2. Submit separate request forms for each type of analyses as follows: Segregate and ship your samples in individual categories of air, bulk, wipe, and biological samples subdivided by metals and organics. (NOTE: When submitting two items as one sample (e.g., two collection tubes in series or a prefilter followed by an absorption tube), number the items with one field number followed by "A" and "B" (e.g., #23A, #23B). Since these two items are one sample use only one column on the sample submission form NEHC 5100/13).

3. Request for analytes should not exceed 3 or 4 organic compounds per sorbent tube. Always check compatibility information on page 8 to ascertain the contaminants collected are compatible with each other and with the analytical procedure. Call the laboratory regarding compatibility when in doubt. Filter samples submitted for metal analyses by atomic absorption spectrophotometry to all CIHL should not contain more than 3 or 4 metals per sample. Since all CIHLs are constantly upgrading analytical instrumentation, check with your lab before submitting a sample for up to ten metals using ICP. Please list the requested metals in order of priority.

4. When requested, ship small quantities of bulk organic solvents in screw cap (Teflon lined) glass vials (e.g., 7.4 milliliter vials, Supelco # 2-3295; or 15 milliliter vials, Supelco #2-3296) to assist the chemist in the analysis of the air samples. Prior to shipment place a permanent ink mark at the level to which the vial is filled. This allows the chemist to determine potential leakage during shipment. Rarely will more than 5.0 milliliters be required. Never ship the bulk and air samples in the same shipping package. Provide information telling the chemist which bulk sample corresponds to the air samples.

5. Most determinations require a minimum of two blanks or one blank for every ten samples submitted, whichever is larger. Remember to always provide 20-30 ml of unexposed impinging solution to be used by the laboratory as reagent blanks and in quality control. The blanks are analyzed by the CIHLs and reported as micrograms (ug) "contaminant" per sample (e.g., per filter, per tube, etc.).

6. All references to water in this guide are deionized or double distilled water.

7. When submitting elemental analysis of hard metal alloys, the bulk sample must be in the form of fine filings, powder or very thin wire.

8. The preferred refrigerant for samples that require refrigeration is freezer packs or frozen gel blocks. Ice may be used for hand-carried lab samples, however the ice must be doubly wrapped in plastic ziplok bags to avoid leakage. Never use ice when shipping by U.S. Postal Services or commercial delivery services.

9. Shipping containers should be appropriately labeled such as "Fragile", "Refrigerated Material", "Liquid Samples", "Etiologic Agent/Biomedical Material", etc.

10. All samples and materials being packaged, labeled and shipped are governed by Federal, State and local regulations. Compliance with these regulations is the responsibility of the person submitting the samples.

11. In the case of unusually large shipments or high priority samples, please contact the laboratory prior to submission (i.e., as a "heads-up").

SAMPLE TURNAROUND TIMES

Samples will be analyzed on a "first come, first served" basis. Urgent samples will be given special priority and analyzed in one to three working days when the laboratory has been notified in advance of the shipment and when the samples have arrived by special shipment or priority mail. Most routine samples will be analyzed within 15 working days after receipt of the sample. If you have not received your analytical report after 30 working days, please notify the laboratory and check on the status of the samples.

SAMPLE COMPATIBILITY

Since sampling and analytical methods are normally evaluated for single analyte, care should be given in the interpretation of the methods' CV. When in doubt concerning multicomponents samples, take individual samples. The following compounds require special processing for analysis and consequently cannot be analyzed for other compounds in the same sample:

Acetic Acid
Acetonitrile
Acrolein
All Cellosolves (can be analyzed on the same tube, e.g., butyl-, methyl- , etc., however these cellosolves and common organics are not compatible)

All impinger analytes
All isocyanates
Ammonia
Aniline
2-Butanone
Camphor
Chlordane
Chromic Acid
Coal Tar Pitch Volatiles
Cresols
Ethylene glycol
Ethylene oxide
Ethyl ether
Formaldehyde
Hydrazine
Methanol
Methyl methacrylate
2-Nitropropane
PCBs
PGDN (Otto Fuel)
Phenol
Pyridine

The following groups of compounds require special processing for analysis. More than one compound within each group can be analyzed in the same sample, but compounds outside the group are incompatible and cannot be analyzed within the same sample:

Group I- Ethyl Alcohol, Isopropyl Alcohol, and t-Butyl Alcohol

Group II- n-Butyl Alcohol, s-Butyl Alcohol, iso-Butyl Alcohol and n-Propyl Alcohol

Group III- Iso-Amyl Alcohol, Diacetone Alcohol, and Cyclohexanol

Group IV- 2-Methoxyethanol, 2-Ethoxyethanol, and 2-Butoxyethanol

LAB SPECIFIC SAMPLES

Each of the CIHLs has declared an area of expertise and it is recommended only these laboratories be used in those speciality areas. The areas and labs are:

Area	Laboratory
Multielement analysis using Inductive Coupled Plasma (ICP) Spectrometry.	Norfolk San Diego
Advanced High Performance Liquid Chromatography.	San Diego
Gas Chromatography/Mass Spectrometry	Norfolk San Diego
X-Ray Diffraction	Pearl Harbor

BIOLOGICAL SAMPLES

See page 6 of this Guide for general policies of sampling, packaging, labelling and shipping biologicals.

BLOOD LEAD AND ZINC PROTOPORPHYRIN

Collect in one of the following Becton Dickinson (BD) Vacutainer Systems listed below:

BD Number & Top Color	Description
6488 Brown top	Sodium heparin tube for whole blood (Specifically for blood lead determination)
6527 Dk Blue top	Sodium heparin tube for whole blood (Specifically for trace element studies)
6541 Green top	Sodium heparin tube for plasma (Specifically for plasma studies)

6450 15% EDTA tube for whole blood
Lavender top

Samples must be thoroughly mixed with the heparin or EDTA immediately following collection. Keep samples refrigerated (do not freeze) and hand deliver or ship to the nearest laboratory using priority shipping methods. Use an insulated shipping container, such as a styrofoam shipper. For shipping long distances, freezer packs and express delivery are required.

URINE MERCURY

See page 6 of this Guide for general policies of sampling, packaging, labelling and shipping biologicals.

By BUMED INSTRUCTION 6260.2, dated 7 November 1988, biological monitoring for mercury is no longer required. The potential for personnel exposure to elemental mercury vapor has been greatly reduced by the use of preencapsulated amalgams. Industrial hygiene surveys have shown routine use of preencapsulated amalgams does not result in overexposure of dental personnel to elemental mercury vapor. Therefore, by this BUMED instruction, neither biological sampling or air sampling is specifically required. Occasionally mercury urine may be prescribed by an occupational health professional as circumstances warrant.

Collect sample (first morning void, if possible) in the standard drug screening plastic bottle (NSN 6640-00-165-5778) and add 100 milligrams of potassium persulfate, a preservative. Please do not send more than 20 milliliters of urine per sample. Hand tighten the lid, and place each bottle in a ziplok bag to contain any leakage during transit to the laboratory. Refrigerate during storage and ship, as soon as possible, in an insulated shipping container, using freezer packs (gel blocks) and express delivery.

IMPINGER MEDIA PREPARATION

Impinger samples should be hand delivered to the laboratory. When this is not possible, the samples should be quantitatively transferred to 22 milliliter glass bottles with Teflon-lined caps (Supelco #2-3297M). Always provide the laboratory with a minimum of 20-30 milliliters of unexposed absorbing solution for a reagent blank.

The impinging solutions are:

Analyte	Impinging Solutions
Ammonia	0.01 N Sulfuric Acid (Add 0.28 milliliters conc H_2SO_4 to 1 liter of double distilled or deionized water)
Cyanide	0.1 N Potassium Hydroxide (add 5.6 grams KOH to 1 liter of double distilled water or deionized water)
Formaldehyde	1% Sodium Bisulfite solution (1 gram $NaHSO_3$ in 100 milliliters of double distilled or deionized water)
Hydrazine	0.1 N Hydrochloric Acid (add 8.6 milliliters of conc HCl to 1 liter of double distilled water or deionized water)
Sulfur Dioxide	0.3 M Hydrogen Peroxide (add 17 ml of 30% H_2O_2 to one liter of double distilled or deionized water)

NOTE: 20-30 ml of unexposed reagent is required for reagent blank for all impinging solutions above.

SPECIAL SAMPLING & ANALYSES

BULK SAMPLE SUBMISSIONS

The primary function of any industrial hygiene laboratory is the analysis of breathing zone air samples for contaminants. The CIHLs generally do not perform routine inventory environmental samples (e.g., heavy metals in paint, soil, water) or other bulk sample analysis

to determine what components they contain or whether they meet manufacturer's specifications. Information for the latter is available by writing the manufacturer and requesting product literature and Material Safety Data Sheets. Products for which this information is not available should not be used in the Navy system. Bulk samples should be submitted to the laboratories only under the following conditions:

(1) When the laboratory requests a bulk, as is required in the analytical method (e.g., PCBs, Naphthas, etc.).

(2) When all other means of obtaining information on the chemical composition of the material have been exhausted and prior approval has been given by the laboratory.

CHROMIUM AND CHROMATES

Chromium metal, Cr(II) and Cr(III) compounds are collected on mixed cellulose ester filters (MCEF) and analyzed using atomic absorption spectrometry or ICP. Cr(VI) compounds cannot be determined if sampled on a MCEF.

Chromium in the +6 oxidation state (i.e., Cr (VI), chromic acid, chromium trioxide, all chromates and dichromates) must be collected on PVC filters, with backup pads. If other filter materials are used, the Cr(VI) may be reduced to the Cr(II) or Cr (III) states and thus give a reduced value for Cr(VI).

NOTE: You no longer must separate the filter from the pad and place in a glass vial.

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COAL TAR PITCH VOLATILES (CTPVs)/COKE OVEN EMISSIONS (COEs)/SELECTED POLYNUCLEAR AROMATIC HYDROCARBONS (PNAHs)

The coal tar pitch volatile test is designed for coal tar which has a high concentration of PNAHs. A summary of the test consists of :

1. Dissolving the sample in benzene and evaporating half the benzene mixture to determine how much benzene soluble is present. This part of the test is nonspecific, since almost all organics will dissolve in benzene.

2. To determine whether this material is a hazardous

coal tar pitch or asphalt or just organic, a second test is performed on the remaining benzene-soluble fraction. It is analyzed for chrysene and benzo(a)pyrene using OSHA's test for PNAHs.

SAMPLING CTPVs, COEs, AND SELECTED PNAHs

Air samples are collected by drawing known amounts of air through cassettes containing glass fiber filters (GFF). The recommended air volume is 960 liters at 2.0 LPM. Each GFF must be transferred to a separate vial after sampling and the vial sealed with a Teflon-lined cap. Samples must be protected from direct sunlight by wrapping aluminum foil around the vial.

ANALYSIS OF CTPVs, COEs, AND SELECTED PNAHs

The filters are analyzed in the lab by extracting with benzene and gravimetrically determining the benzene-soluble fraction (BSF). If the BSF exceeds the appropriate exposure limit, the rest of the sample is analyzed by high performance liquid chromatography (HPLC) with a fluorescence or ultraviolet detector to determine the presence of selected PNAHs.

INTERPRETATION OF (CTPV) STANDARD

OSHA interprets violation of the CTPV standard as exceeding 0.2 mg/M^3 of benzene-soluble material in air with the lab analysis of the benzene soluble fraction confirming the presence of benzo (a)pyrene and one or more of the five additionally named fused polycyclic hydrocarbons to which the standard refers: anthracene, acridine, pyrene, chrysene and phenanthrene. Sample for CTPV only when the work process involves or potentially involves the residues from heated and distilled tars derived from coal, petroleum, wood, shale oil or other organic materials. Asphalt is specifically exempted from the CTPV standard.

ENVIRONMENTAL SAMPLES

All CIHLs are presently applying for AIHA accreditation in the National Lead Laboratory Accreditation Program (NLLAP) which was established

by the U.S. Environmental Protection Agency (EPA) to evaluate and improve the performance of labs conducting analytical testing associated with lead abatement. When your CIHL is accredited it will then accept paint chips and dust wipes for lead analyses. Contact your local CIHL for a start-up date and sampling protocol. Since EPA methods emphasize outside environmental exposures over long periods of time, always contact your CIHL before sampling in a nontraditional, nonoccupational manner.

FIBER COUNTS AND ASBESTOS IDENTIFICATION

These determinations are to be made in the field or at the local activity level. The CIHLs will assist on a case-by-case basis, however, prior approval for accepting these samples must be received from the CIHL before submitting fiber counts and asbestos identification samples to the CIHLs. Laboratories performing asbestos tests must be proficient in the appropriate proficiency testing programs, (i.e., the Proficiency Analytical Testing (PAT) program for fiber counts and the NAVENVIRHLTHCEN's contractor-operated program for bulk asbestos identification).

POLYCHLOROBIPHENYLS (PCBs)

All CIHLs routinely determine the PCB content in bulk samples as it relates to occupational health, with a lower reporting level of 0.1% or 1000 ppm. The laboratories do not routinely analyze to the EPA standard of 50 ppm for waste disposal purposes.

SILICA (CRYSTALLINE SILICA) ANALYSIS

This method determines silica in respirable dust by the OSHA method. The sample filter used is a 5 micrometer membrane filter. Pearl Harbor lab requires SILICAL PVC filters available from Omega Specialty Instrument Company, Chelmsford, MA 01824, phone (508) 256-5450 or FAX: (508) 256-8015. The respirable dust sample is collected at 1.7 LPM for 800 to 1000 liter of air. Care should be exercised to assure a loading of less than 2.0 milligrams.

Bulk samples can be semi-quantitatively analyzed for quartz and cristobalite.

CORRECTION FACTORS

Certain metals (and cyanide) compounds in this guide are reported by the CIHLs "as" the metal ("as" the cyanide). The analytical instrument "sees" only the metal and ignores any other elements that make up the compound sampled. For example, if a sample of iron oxide (Fe_2O_3) is submitted for analysis, the lab reports the results "as Fe". If the analysis indicates a concentration of 10 micrograms iron per sample, this corresponds to a concentration of that amount of iron, not this amount of fume. It is the responsibility of the Industrial Hygienist who took/submitted the sample to convert the results to the correct weight of Fe_2O_3. This is done by dividing the molecular weight (MW) of the compound by the MW of the metal (or cyanide) contained. In this case the following apply:

MW of Fe_2O_3 ÷ MW of Fe_2 = 159 ÷ 111 = 1.4 (Correction Factor)

Multiplying the Correction Factor by the analytical results gives the correct weight of the contaminant.

1.4 times 10 micrograms iron = 14 micrograms of iron oxide

Correction Factors must be calculated and applied to all metal (and cyanide) compounds in this Guide which are reported "as ....".

SOURCES OF ANALYTICAL SUPPLIES

NOTE: The mention of specific company names and products does not constitute endorsement by the Navy Environmental Health Center.

MANUALS

The NIOSH analytical manuals may be obtained from:

National Technical Information Service
5285 Port Royal Road

Springfield VA 22161
Phone: (703) 487 4650

[NIOSH Manual of Analytical Methods, fourth edition, 3 parts, Aug 94, DHHS Publication No. 94-113, NTIS Publication No. PB95154191, price $134.]

The OSHA analytical manuals may be obtained from:

ACGIH Publications
1330 Kemper Meadow Drive
Cincinnati, OH 45240-1634
Phone: (513) 742-2020 FAX: (513) 742-3355
[Publication #4542 and #4544, Price $300.]

SKC, Inc. World Headquarters
863 Valley View Road
Eight Four, PA 15330-9614
Phone: (800) 752-8472 FAX: (800) 752-8476
[Catalog #877-36 and #877-38, $344.]

The OSHA Chemical Information Manual, 1991 Edition, may be obtained from:

SKC, Inc. World Headquarters
863 Valley View Road
Eight Four, PA 15330-9614
Phone: (800) 752-8472 FAX: (800) 752-8476
[Catalog #877-35, Price: $60.]

FILTERS AND SORBENT TUBES

Filters and sorbent tubes may be obtained from a number of sources; however, this manual cites SKC order number for filters and tubes (listed in the SPECIAL INSTRUCTIONS column in the Laboratory Sampling Guide), simply because of convenience and uniformity.

Special attention should be given to SKC Guide to NIOSH/OSHA Air Sampling Standards which is in the SKC Comprehensive Catalog and Air Sampling Guide (Request free copy from SKC.)

SKC, Inc. World Headquarters
863 Valley View Road
Eight Four, PA 15330-9614
Phone: (800) 752-8472 FAX: (800) 752-8476

SKC, Gulf Coast
9827 Whithorn Drive

Bellefonte, PA 16823-0048

Houston, TX 77095-5027
Phone: (800) 225-1309 FAX: (800)752-4853

SKC, West
P.O. Box 4133
Fullerton, CA 92634-4133
Phone: (800) 752-9378 FAX: (800) 752-1127

Supelco, Inc.
Supelco Park
Bellefonte, PA 16823-0048
Phone: (800) 247-6628 FAX: (800) 447-3044
Technical information only phone: (800) 359-3041

Forest Biomedical
3975 South Main Street
Suite B
Salt Lake City, UT 84107
Phone: (801) 269-1327 FAX: (801) 269-1254

PASSIVE MONITORS

3 M Company
Occupational & Environmental Safety Division
3 M Center, Bldg 224-5S-04
St. Paul, MN 55144-1000
Phone: (800) 752-3623 (Federal System Group orders)
Technical information only phone: (800) 243-4630

Landauer Inc.
2 Science Road
Glenwood, IL 60425-1586
Phone: (708) 755-7000 FAX: (708) 755-7016

PRINTED SAMPLE NUMBER LABELS

Shamrock Scientific
34 Davis Drive
Bellwood, IL 60104
Phone: (800) 323-0249 FAX: (800) 248-1907

OTHER-SAMPLE COLLECTION BOTTLES, VIALS, AND SUPPLIES

Supelco, Inc.
Supelco Park

Phone: (800) 247-6628 FAX: (800) 447-3044
Technical information only phone: (800) 359-3041

SKC, Inc. World Headquarters
863 Valley View Road
Eight Four, PA 15330-9614
Phone: (800) 752-8472 FAX: (800) 752-8476

ABBREVIATIONS USED THROUGHOUT THE GUIDE

N	Norfolk Laboratory
P	Pearl Harbor Laboratory
S	San Diego Laboratory
@	at the concentration of
AMBERSORB	Special type of adsorption tube
Aq	aqueous
BSF	Benzene Soluble Fraction
CAS#	Chemical Abstract Service Registry Number
CIHL	Consolidated Industrial Hygiene Laboratory
CHROMOSORB	Special type of adsorption tube
CT	Charcoal tube (see special instructions for a part number)
2CT	Two charcoal tubes connected in series
CV	Coefficient of Variation
FLORISIL	Special type of adsorption tube
FLT	Filter
GFF	Glass fiber filter
HOPCALITE	Special type of adsorption tube for Mercury vapor
ICP	Inductive Coupled Plasma (analyzes multiples of metals per sample)
INHOUSE	laboratory method developed within the organization
L	liters
LPM	liters per minute
LOD	limit of detection (an amount equal to three times the standard deviation of the analytical noise or three times that of a blank, whichever is more appropriate).
0.8 MCEF	Mixed cellulose ester filter, 0.8 micrometer pore size
mg/m^3	milligrams per cubic meter
ml	milliliters
mm	millimeter
MW	Molecular Weight
NIOSH	National Institute for Occupational Safety and Health
ORBO	Adsorption tube trade marked by Supelco
OSHA	Occupational Safety and Health Administration
OVS-2	Special collection device for pesticides, available from Forest Biomedical.
ppm	parts per million
PTFE	Polytetrafluoroethylene filter
PVC	Polyvinyl chloride filter, 5 micrometer pore size
QCC	Quality Control Coordinator
SG	Silica gel sampling tube
ST	Sorbent tube
TENAX	Special type of adsorption tube
um	micrometer
XAD	Special type of adsorption tube

BIOLOGICAL GUIDE

BIOLOGICAL SUBSTANCE	METHOD	CV	LOD	COLLECTION METHOD	SPECIAL INSTRUCTIONS	LAB
LEAD IN BLOOD	NIOSH 8003/LAB	0.07	<5ug/dl	HEPARINIZED VACUTAINER (SEE PAGE 9)	Mix thoroughly immediately after collection; refrigerate shipment using overnight courier service. (see pages 6-8 for labeling and shipping instructions)	ALL
MERCURY IN URINE	NIOSH 165/LAB	0.073	<5 ug/l	DRUG SCREENING BOTTLE (SEE PAGE 9)	Add 100 mg of potassium persulfate per sample bottle as the preservative. Refrigerate shipment using overnight courier service. (see pages 6-8 for labeling and shipping instructions)	ALL
ZINC PROTOPORPHYRIN IN BLOOD	LAB METHOD	0.10	<10ug/dl	HEPARINIZED VACUTAINER (SEE PAGE 9)	Mix thoroughly immediately after collection; refrigerate shipment using overnight courier service. (see pages 6-8 for labeling and shipping instructions)	ALL

See special packaging, labeling and shipping requirements for Biological Samples on pages 6 - 9.

LABORATORY SAMPLING GUIDE

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
ACETALDEHYDE	75-07-0	OSHA 68	0.061	3	XAD-2 COATED	3L	0.05	ST 226-27	N
ACETIC ACID	64-19-7	NIOSH 1603	0.058	10	CT 100/50	20L@10ppm-300L	0.01-1.0	ST 226-01. Not compatible with other organics.	N
		OSHA ID-186SG (in-house)	0.11	10	CT 100/50	20L@10ppm-300L	0.01-1.0	ST 226-01. Not compatible with other organics.	P
		NIOSH 7903	0.06	20	SG 400/200	100L	0.2-0.5	ST 226-10-03	S
ACETONE	67-64-1	NIOSH 1300	0.024	20	CT 100/50	0.5L-3.0L	0.01-0.2	ST 226-01	ALL
		OSHA 69	0.082	20	ANASORB CMS 150/75	3	0.05	ST 226-121	N
ACETONITRILE	75-05-8	NIOSH 1606	0.072	10	CT 400/200	3L@70mg/m^3 -25L	0.01-0.2	ST 226-24. Not compatible with other organics.	N S
ACIDS, INORGANIC (HF, HCl, H_3PO_4, HBr, HNO_3, H_2SO_4)		NIOSH 7903	F 0.12 Cl 0.06 PO_4 0.10 Br 0.07 NO_3 0.09 SO_4 0.09	0.7 0.6 2.0 0.9 0.7 0.9	SG 400/200 or ORBO 53	3L-100L	0.2-0.5	ST 226-10-03 (may contain high sulfate) Supelco 2-0265M is perferred; send blanks	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
ACROLEIN	107-02-8	OSHA 52	0.061	2	XAD-2 COATED 150/75	3L-48L	0.1-0.2	ST 226-117 or ORBO 24 Not compatible with other organics.	N P
ACRYLAMIDE	79-06-1	OSHA 21	0.071	0.46	GFF & SG	120 L	1	Supelco 2-0229 & 2-3376	N
ACRYLO-NITRILE	107-13-1	NIOSH 1604	0.06	1	CT 100/50	3.5L@2ppm-20L	0.01-0.2	ST 226-01 Not compatible with other organics	N
ALDICARB (TEMIK)		OSHA 74	0.067	0.12	Special collection device	480L	1	ST 226-30 or OVS-2 from Forrest Biomedical	N
ALDRIN	309-00-2	NIOSH 5502	0.092	3	GFF & BUBBLER	18L@0.25mg /m^3-240L	0.2-1.0	FLT 225-7 15ml ISOOCTANE, Ship in glass vial (i.e. Supelco #2-3297)	N
ALUMINUM and compounds as (Al) EXCEPT Al_2O_3	7429-90-5	NIOSH 7013	0.080	2	0.8 MCEF	10L@5mg/m^3 -400L	1-3	FLT 225-5	ALL
		NIOSH 7300 OSHA 125	0.080	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
ALUMINUM OXIDE (Al_2O_3)	1344-28-1	OSHA in house	0.080	2	0.8 MCEF	100L	2	FLT 225 -5 Not compatible with other metals.	N
AMINOETHANOL	141-43-5	NIOSH 2007	0.056	5	SG 300/150	10L	0.01-0.2	ST 226-10-04 Add 20ul conc. HCl to tube immmediately after sampling - ship to lab	N
AMMONIA (NH_3)	7664-41-7	NIOSH S347	0.062	5	SG 200/100 ACID TREATED	30L	0.1-0.2	ST 226-10-06	P S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
		NIOSH 205	0.10	5	IMPINGER	30L	1-2	IMPINGE IN 0.01N Sulfuric Acid	P
		OSHA 188	0.050	25	CARBON BEADS	24L	0.1	ST 226-29 or Supelco ORBO 77	N
n-AMYL ACETATE	628-63-7	NIOSH 1450 & OSHA 7	0.051	2.6	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
sec-AMYL ACETATE	626-38-0	NIOSH 1450 & OSHA 7	0.071	3.3	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
iso-AMYL ACETATE	123-92-2	NIOSH 1450 & OSHA 7	0.056	2.6	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
iso-AMYL ALCOHOL	123-51-3	NIOSH 1402	0.077	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics.	ALL
ANILINE	62-53-3	NIOSH 2002	0.06	10	SG 150/75	20L	0.4	ST 226-10	N
ANTIMONY (Sb)	7440-36-0	OSHA 121	0.081	1	0.8 MCEF	480L	1-2	FLT 225-5	S P
		OSHA 125	0.064	1	0.8 MCEF	480L	2	FLT 225-5	N
ARSENIC and compounds as As	7440-38-2	NIOSH 7900	0.11	0.02	0.8 MCEF	30L@0.002mg/m^3-1000L	1-3	FLT 225-5 Particulate only	N P
		NIOSH 7300 & OSHA 125	0.10	1.0	0.8 MCEF	30L - 2000L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
		OSHA 105	0.10	0.05	0.8 MCEF	960	2	FLT 225-5 Particulate only	N
ARSINE	7784-42-1	NIOSH 6001	0.06	0.004	CT 100/50	30L	0.2	ST 226-01	N
ASBESTOS IDENTIFICATION OF BULK MATERIAL		NIOSH 9002	lab detn	< 1.0%	BULK, CLEAR 4"X4" ZIPLOK	<10 Grams, 2x2x2 cm		4"x4" Ziplok bag 8105-00-837-7753, Asbestos ID is to be done locally	FIELD
ASPHALT	8052-42-4							(See PNAH)	
BARIUM, Soluble compounds as Ba	7440-39-3	NIOSH 7056	0.054	2	0.8 MCEF	50L - 2000L	1-4	FLT 225-5	N S
BAYGON (PROPOXUR)	114-26-1	OSHA IMIS0318	0.059	1	Special collection device	480L	1	ST 226-30-16 or OVS-2 from Forrest Biomedical	P
BENZENE	71-43-2	NIOSH 1500/1501 & OSHA 7	0.059	10	CT 100/50	2L-30L	0.01-0.2	ST 226-01	ALL
BENZENE SOLUBLES								(See PNAH)	
BERYLLIUM and compounds as Be	7440-41-7	NIOSH 7102	0.064	0.005	0.8 MCEF	25L@0.002mg/m^3-1000L	1-4	FLT 225-5	P S
	7440-41-7	NIOSH 7300 & OSHA 125	0.060	0.05	0.8 MCEF	250L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
BISPHENOL A	80-05-7	NIOSH 333	0.053	0.4	GFF	180L	1	FLT-225-7	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
BROMINE	7726-95-6	NIOSH 6011	0.069	1.6	Silver membrane filter	8-360L	0.3-1.0	FLT 225-1802	N
BROMOFORM (TRIBROMOMETHANE)	75-25-2	NIOSH 1003	0.043	10	CT 100/50	4L@0.5ppm-70L	0.01-0.2	ST 226-01	N S
BROMOTRIFLUOROMETHANE (REFRIGERANT 13B1)	75-63-8	NIOSH 1017	0.065	50	2CT (400/200 + 100/50)	5L	0.01-0.05	ST 226-09 & 226-01 Sample in series, disconnect and cap each for shipment	N
1,3-BUTADIENE	106-99-0	OSHA 56	0.065	1	CT TREATED	3L	0.05	ST 226-73	N
2-BUTANONE (METHYL ETHYL KETONE - MEK)	78-93-3	OSHA 84	0.084	1	ANASORB CMS 150/75	3L	0.050	ST 226-121. Not compatible with other organics.	ALL
		OSHA 16	0.059	12	2SG 150/75	1L-12L	0.1	ST 226-10 Sample in series, separate; ship to lab. Not compatible with other organics.	N S
2-BUTOXYETHANOL (BUTYL CELLOSOLVE)	111-76-2	NIOSH 1403 & OSHA 7	0.068	20	CT 100/50	1L-10L	0.01-0.05	ST 226-01 Not compatible with other organics. Store FREEZER.	ALL
n-BUTYL ACETATE	123-86-4	NIOSH 1450	0.069	2	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
sec-BUTYL ACETATE	105-46-4	NIOSH 1450	0.054	2	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
tert-BUTYL ACETATE	540-88-5	NIOSH 1450	0.091	2	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
iso-BUTYL ACETATE	110-19-0	NIOSH 1450	0.065	2	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
sec-BUTYL ALCOHOL	78-92-2	NIOSH 1401 & OSHA 7	0.066	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics. Store FREEZER	ALL
tert-BUTYL ALCOHOL	75-65-0	NIOSH 1400 & OSHA 7	0.075	10	CT 100/50	0.5L-10L	0.01-0.2	ST 226-01 Not compatible with other organics. Refrigerate shipment.	ALL
n-BUTYL ALCOHOL	71-36-3	NIOSH 1401 & OSHA 7	0.065	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics. Store FREEZER	ALL
iso-BUTYL ALCOHOL	78-83-1	NIOSH 1401 & OSHA 7	0.073	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics. Store FREEZER.	ALL
n-BUTYL GLYCIDYL ETHER (BGE)	2426-08-6	NIOSH S81 & OSHA 7	0.074	300	CT 100/50	10L	0.2	ST 226-01	ALL
BUTYLCELLOSOLVE ACETATE	112-07-2	OSHA 83	0.055	7.2	CT 100/50	48L	0.1	ST 226-01	ALL
CADMIUM and compounds as Cd	7440-43-9	NIOSH 7300	0.064	0.05	0.8 MCEF	200L	1-4	FLT 225-5	N S
		NIOSH 7048	0.06	0.05	0.8 MCEF	50L@0.05mg /m^3-1500L	1-3	FLT 225-5	P S
		OSHA 189	0.07	0.01	0.8 MCEF	960L	2	FLT 225-5	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
CALCIUM and compounds as Ca	7440-70-2	NIOSH 7300 & OSHA 125	0.063	1	0.8 MCEF	50L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	ALL
		NIOSH 7020	0.063	1	0.8 MCEF	20L@5mg/m^3 -400L	1-3	FLT 225-5	S
CAMPHOR (SYNTHETIC)	76-22-2	NIOSH 1301	0.074	50	CT 100/50	1L-25L	0.01-0.2	ST 226-01 Not compatible with other organics.	S
CARBARYL	63-25-2							See SEVIN	
CARBON BLACK (NON-SPECIFIC)	1333-86-4	NIOSH 5000	0.056	0.03	TARED 5um PVC or dual MCEF	85L@3.5mg/ m^3-570L	1.5-2	FLT 225-8-01 or FLT 225-8202 (matched wt) Anaylsis performed in field.	FIELD
CARBON DISULFIDE	75-15-0	NIOSH 1600	0.059	20	CT 100/50	2L@100ppm-25L	0.01-0.2	ST 226-01	N P
CARBON TETRACHLORIDE	56-23-5	NIOSH 1003 & OSHA 7	0.092	10	CT 100/50	3L@10ppm-150L	0.01-0.2	ST 226-01	ALL
CHLORINE	7782-50-5	NIOSH 6011	0.075	0.6	Silver membrane filter	2L-90L	1	FLT 225-1802	N
CHLORDANE	57-74-9	OSHA 67	0.089	30	Special collection device	480L	1	ST 226-30-16 or OVS-2 from Forrest Biomedical	N
CHLOROBENZENE	108-90-7	NIOSH 1003 & OSHA 7	0.056	10	CT 100/50	1.5L@75ppm-40L	0.01-0.2	ST 226-01	P S
CHLOROFORM (TRICHLOROMETHANE)	67-66-3	NIOSH 1003 & OSHA 7	0.057	20	CT 100/50	1L@50ppm-50L	0.01-0.2	ST 226-01	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
CHLOROTRIFLUOROMETHANE (REFRIGERANT 13)	75-72-9	NIOSH S111	0.064	85	2CT 400/200	3L	0.01-0.05	ST 226-09 Tubes in series, separate, cap and ship to lab.	N
CHLORPYRIFOS	2921-88-2							See DURSBAN	
CHROMIUM and compounds as total Cr	7440-47-3	NIOSH 7300 & OSHA 125	0.073	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	ALL
		NIOSH 7024	0.076	1	0.8 MCEF	10L@0.5mg/m^3-1000L	1-3	FLT 225-5	P S
CHROMIUM VI (HEXAVALENT as in Chromic Acid, CrO_3)	7738-94-5	OSHA 215	0.059	0.01	5.0 PVC	960 L@0.11 ug/m^3-For full shift sample. 30L for 15 min. Ceiling assessment.	2	FLT 225-806 NOTE: No longer required to separate filter from pad and send in vial.	ALL
COAL DUST	68131-74-8	NIOSH 7500	0.13	10	Tared PVC + CYCLONE	400L@0.05mg/m^3-1000L	1.7	FLT 225-8-01 Sample **must be** respirable fraction.	P
COAL TAR PITCH VOLATILES	65996-93-2							See PNAH	
COBALT and compounds as Co	7440-48-4	NIOSH 7300 & OSHA 125	0.070	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	ALL
		NIOSH 7027	0.070	0.6	0.8 MCEF	30L@0.1mg/m^3-1500L	1-3	FLT 225-5	P S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
COPPER DUST / FUME as Cu	7440-50-8	NIOSH 7029	0.094	0.5	0.8 MCEF	50L@0.1mg/m^3-1500L	1-3	FLT 225-5	P S
		NIOSH 7300 & OSHA 125	0.067	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
o, m, p-CRESOL (ALL ISOMERS)	1319-77-3	NIOSH 2546	0.10	26	XAD-7 100/50	1.0-24 L	0.01-0.1	ST 226-95	N S
CUMENE (ISOPROPYL BENZENE)	98-82-8	NIOSH 1501 & OSHA 7	0.060	10	CT 100/50	10L-30L	0.01-0.2	ST 226-01	N S
CYANIDES (AEROSOL / GAS) as CN		NIOSH 7904	0.10	2.5	0.8 MCEF + BUBBLER	10L@5mg/m^3 -180L	0.5-1.0	FLT 225-5, 10ml 0.1N KOH Ship in glass vial (Supelco#2-3297)	ALL
		NIOSH 6010	0.061	1	SODA LIME 600/200	3L	0.2	ST 226-28	N
CYCLOHEXANE	110-82-7	NIOSH 1500 & OSHA 7	0.060	10	CT 100/50	2.5L-5L	0.01-0.2	ST 226-01	ALL
CYCLOHEXANOL	108-93-0	NIOSH 1402 & OSHA 7	0.080	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics.	P S
CYCLOHEXANONE	108-94-1	OSHA 1	0.052	10	CHROMOSORB 106 (100/50)	10L	0.05	ST 226-49-60106	ALL
		NIOSH 1330 & OSHA 7	0.063	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01	S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
CYCLOHEXENE	110-83-8	NIOSH 1500 & OSHA 7	0.073	10	CT 100/50	5L-7L	0.01-0.2	ST 226-01	S
CYCLOHEXYL-AMINE	108-91-8	OSHA INHOUSE	0.10	2	COATED XAD-7	10 L	0.1	ST 226-98	N
CYCLONITE								(See RDX)	
DDVP (DICHLOROVOS)	62-73-7	OSHA 62	0.057	0.7	Special collection device	480L	1	ST 226-30-16 or OVS-2 from Forrest Biomedical	N S
DIACETONE ALCOHOL	123-42-2	NIOSH 1402 & OSHA 7	0.10	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics.	ALL
DIAZINON	333-41-5	OSHA 62	0.057	0.2	Special collection device	480L	1	ST 226-30-16 or OVS-2 from Forrest Biomedical	ALL
o-DICHLORO-BENZENE	95-50-1	NIOSH 1003 & OSHA 7	0.068	10	CT 100/50	1L@50ppm-60L	0.01-0.2	ST 226-01	ALL
DICHLORO-DIFLUOROMETHANE (REFRIGERANT 12)	75-71-8	NIOSH 1018	0.061	50	2CT (400/200 + 100/50)	1L@1000ppm-4L	0.01-0.5	ST 226-09 & 226-01 Tubes in series, separate, cap, ship to lab	ALL
1,1-DICHLOROETHANE	75-34-3	NIOSH 1003 & OSHA 7	0.057	10	CT 100/50	0.5L@100ppm-15L	0.01-0.2	ST 226-01	S
1,2-DICHLOROETHANE								SEE ETHYLENE DICHLORIDE	

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
1,2-DICHLORO-ETHYLENE	540-59-0	NIOSH 1003 & OSHA 7	0.052	10	CT 100/50	0.2L@200ppm-5L	0.01-0.2	ST 226-01	S
2,4-DICHLORO-PHENOXY ACETIC ACID	94-75-7	NIOSH 5001	0.051	10	GFF	100L	1	FLT 225-7	S
DIELDRIN	60-57-1	NIOSH S283	0.086	0.1	GFF	180L	0.1-1.5	FLT 225-7 Ship in glass vial (Supelco#2-3297)	N
DIETHYLENE TRIAMINE	111-40-0	OSHA 60	0.080	0.16	XAD-2 270/140	10L	0.1	ST 226-30-18	N S
DIISOBUTYL KETONE	108-83-8	NIOSH 1300 & OSHA 7	0.082	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01	S
DIMETHYL ACETAMIDE	127-19-5	NIOSH 2004	0.067	10	SG 150/75	15-80 L	0.01-1.0	ST 226-10	N
DIMETHYL-FORMAMIDE (DMF)	68-12-2	NIOSH 2004	0.056	10	SG 150/75	15L@30mg/m^3-80L	0.01-1.0	ST 226-10	N S
DIOCTYL PHTHALATE	117-84-0	OSHA 104	0.10	10	OVS + TENAX	240L	1	ST 226-56	N
		NIOSH 5020	0.057	10	MCEF	6-200 L	1-3	FLT 225-5	N
p-DIOXANE (1,4-DIETHYLENE DIOXIDE)	123-91-1	NIOSH 1602 & OSHA 7	0.054	10	CT 100/50	0.5L@100ppm-15L	0.01-0.2	ST 226-01	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
DIPROPYLENE GLYCOL METHYL ETHER	34590-94-8	OSHA 7	0.10	10	CT 100/50	10L	0.01-0.2	ST 226-01	N S
DIQUAT	2764-72-9	OSHA INHOUSE	0.10	1	GFF	120 L	1	FLT 225-7	N
DURSBAN (CHLORPYRIFOS)	2921-88-2	OSHA 62	0.078	0.1	Special Collection Device	480L	1	ST 226-30-16 or OVS-2 from Forrest Biomedical	ALL
DUST (NUISANCE & RESPIRABLE)		NIOSH 0600	0.056	0.03	TARED 5um PVC + CYCLONE	75L@5mg/m^3 -1000L	1.7	FLT 225-8-01 or 225-8202 (matched wt) FIELD	FIELD
DUST (TOTAL NUISANCE)		NIOSH 0500	0.056	0.03	TARED 5um PVC FILTER	25L@15mg/m^3-133L	1.5-2.0	FLT 225-8-01 or 225-8202 (matched wt) FIELD	FIELD
ENFLURANE (ETHANE OR ETHRANE)	13838-16-9	OSHA 29	0.090	30	2CT 100/50 or CT 400/200	12L	0.1-0.2	ST 226-01 Tubes in series or ST 226-09	N S
		OSHA 103	0.091	30	ANASORB CMS 150/75	12L	0.05	ST 226-121	N
EPICHLORO-HYDRIN	106-89-8	NIOSH 1010 & OSHA 7	0.057	10	CT 100/50	2L@2ppm-30L	0.01-0.2	ST 226-01	ALL
2-ETHOXYETHAN-OL (ETHYL CELLOSOLVE)	110-80-5	OSHA 79	0.081	0.75	CT 100/50	15L-48L	0.1-1.0	ST 226-01 Not compatible with other organics. Store FREEZER. Larger volume for lower PEL	N S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
		NIOSH 1403	0.059	20	CT 100/50	1L-6L	0.01-0.05	ST 226-01 Not compatible with other organics. Store FREEZER	ALL
2-ETHOXYETHYL-ACETATE (CELLOSOLVE ACETATE)	111-15-9	OSHA 79	0.079	0.8	CT 100/50	15L-48L	0.1-1.0	ST 226-01Not compatible with other organics. Store FREEZER. Larger volume for lower PEL	N S
		NIOSH 1403	0.062	20	CT 100/50	1L-6L	0.01-0.05	ST 226-01 Not compatible with other organics. Store FREEZER	ALL
ETHYL ACETATE	141-78-6	NIOSH 1457 & OSHA 7	0.058	15	CT 100/50	6L	0.01-0.2	ST 226-01	ALL
ETHYL ACRYLATE	140-88-5	NIOSH 1450 & OSHA 7	0.054	20	CT 100/50	1L-10L	0.01-0.2	ST 226-01	N S
ETHYL ALCOHOL	64-17-5	NIOSH 1400	0.065	10	CT 100/50	0.1L-1.0L	0.05	ST 226-01 Not compatible with other organics. REFRIGERATE shipment.	ALL
		OSHA 100	0.077	10	ANASORB 747	12L	0.05	ST 226-82 Two tubes in series	ALL
ETHYLAMINE	75-04-7	OSHA 36	0.054	0.3	XAD-7 COATED 100/50	10L	0.2	ST 226-30-13-07	N S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
ETHYL BENZENE	100-41-4	NIOSH 1501 & OSHA 7	0.089	10	CT 100/50	10L-24L	0.01-0.2	ST 226-01	ALL
ETHYL BROMIDE	74-96-4	NIOSH 1011	0.054	20	CT 100/50	0.5L@200ppm-4L	0.01-0.2	ST 226-01	S
ETHYL BUTYL KETONE (3-HEPTANONE)	106-35-4	NIOSH 1301 & OSHA 7	0.096	10	CT 100/50	1L-25L	0.01-0.2	ST 226-01	ALL
ETHYL ETHER	60-29-7	NIOSH 1610 & OSHA 7	0.053	10	CT 100/50	0.25L-3.0L	0.01-0.2	ST 226-01 Not compatible with other organics.	N S
ETHYL-3-ETHOXYPROPIONATE	763-69-9	KODAK INHOUSE	0.10	2.4	CT 100/50	10L	0.2	ST 226-01	N
ETHYL FORMATE	109-94-4	OSHA 7	0.10	10	CT 100/50	10L	0.01-0.2	ST 226-01	S
ETHYLENE DIAMINE	107-15-3	OSHA 60	0.063	3.7	XAD-2 COATED	10L	0.1	ST 226-30-18	N S
ETHYLENE DICHLORIDE (1,2-DICHLOROETHANE)	107-06-2	NIOSH 1003 & OSHA 7	0.079	10	CT 100/50	1L@50ppm-50L	0.01-0.2	ST 226-01	ALL
ETHYLENE GLYCOL	107-21-1	NIOSH 5500	0.085	4	GFF + SG 520/260	0.3L-60L	0.01-0.2	FLT 225-16 & 226-15 Add 1ml 2%aq 2-propanol after sampling. Cap immediately.	ALL
		NIOSH 5523	0.05	10	XAD - OVS 200/100	5L-60L	1	ST 226-57	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
ETHYLENE GLYCOL DINITRATE	628-96-6	NIOSH 2507	0.089	0.6	TENAX GC 100/50	3-100L	0.2-1.0	Supelco 2-0832	N
ETHYLENE GLYCOL MONOBUTYL ETHER ACETATE	112-07-2							(See BUTYL CELLOSOVLE ACETATE)	
ETHYLENE OXIDE (EtO)	75-21-8	NIOSH 1614	0.062	1	HBR COATED CT 100/50	3.0L	0.05-0.15	ST 226-38-03 Not compatible with other organics.	N
ETHYLENE OXIDE 3M (PASSIVE MONITOR)	75-21-8		0.062	1	3M EtO Monitor	15 minutes - 8 hours	0.0493	3M EtO Monitor #3551	S
ETHYLENE THIOUREA	96-45-7	OSHA 95	0.066	1	2 GFF	500L	2	FLT 225-7 Two GFFs	N
FENAMIPHOS	22224-92-6	OSHA INHOUSE	0.10	1	OVS-2	480L	1	ST 226-30-16	N
FIBER COUNT (CLEARANCE MONITORING)		NIOSH 7400	0.12 (field detn)	5.5 F/ 100 fields	0.8 MCEF (25mm)	3850L or greater	0.5-16	FL/CL 225-3-18 or 225-3-20 Adjust volume for fiber density = 100-1300 f/mm^2	FIELD
FIBER COUNT (PERSONAL MONITORING)		OSHA 160	0.12 (field detn)	5.5 F/ 100 fields	0.8 MCEF (25mm)	400L@0.1f/cc	0.5-2.5	FL/CL 225-3-18 or 225-3-20 Adjust volume for fiber density = 100-1300 f/mm^2	FIELD
FIBROUS GLASS (as total NUISANCE DUST)								(See DUST)	

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
FORANE (ISOFLURANE)	26675-46-7	OSHA 103	0.078	2.1	ANASORB CMS 150/75 or ANASORB 747	12L	0.05	ST 226-121 ST 226-81	N
FORMALDE-HYDE	50-00-0	OSHA 64 (Modified)	0.10	1	Waters XPO SURE	22.5 L or 96L	0.2 or 1.5	Waters WATO 47205	S
		OSHA 64 (Modified)	0.10	1	2,4- DNPH GFF			SKC ST 225-9003	S
		NIOSH 3500	0.09	0.5	PFTE + Dual Impinger	1L@3ppm-36L	0.2-1.0	FLT 225-17-01 Transfer soln (1% Sodium Bisulfite) to low density polyethylene shipping bottle. REFRIGERATE	P
		OSHA 52	0.073	0.8	XAD-2 COATED 150/75	3L-24L	0.01-0.2	ST 226-117 or 226-54 STEL (0.2L for 15min) 48L for IAQ studies	N P
		SKC STEL	0.084	1	SKC STEL		15 MINUTES	SKC 526-200	N
		SKC TWA	lab detn	1	SKC TWA		4-8 HOURS	SKC 526-201	N
FORMALDEHYDE 3M (PASSIVE MONITOR)	50-00-0	3M METHOD #4 E	0.084	1	Formaldehyde Monitor 3721	15 minutes - 8 hours	0.0614	3M Formaldehyde 3721 - 8hrs for IAQ studies	ALL
FORMIC ACID	64-18-6	OSHA 112	lab detn	37	CT 100/50	48L	0.2	ST 226-01	N
		OSHA ID-186SG (in-house)	0.11	10	CT 100/50	20L@10ppm-300L	0.01-1.0	ST 226-01. Not compatible with other organics.	P

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
FURFURYL ALCOHOL	98-00-0	NIOSH 2505	0.073	10	PORAPAK Q 150/75	3-75L	0.01-0.05	SUPELCO CUSTOM	N
GASOLINE	8006-61-9	OSHA 48 NIOSH 1550	0.089	80	CT 100/50	3L	0.01-0.2	ST 226-01 Provide 5ml bulk sample	ALL
GLUTAR-ALDEHYDE	111-30-8	OSHA 64	0.064	0.3	2,4-DNPH GFF	15L	1	ST 225-9003	N S
HALOTHANE (FLUOTHANE)	151-67-7	OSHA 103	0.076	2.4	ANASORB CMS	12 L	0.05	ST 226-121	N
HEPTACHLOR	76-44-8	NIOSH S287	0.066	15	CHROMOSORB 102 (100/50)	60L-100L	0.01-1.0	ST 226-49-20102	N
n-HEPTANE	142-82-5	NIOSH 1500 & OSHA 7	0.056	10	CT 100/50	4L	0.01-0.2	ST 226-01	ALL
2-HEPTANONE (METHYL-N-AMYL KETONE)	110-43-0	NIOSH 1301 & OSHA 7	0.066	50	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
3-HEPTANONE	106-35-4							(See ETHYL BUTYL KETONE)	
HEXACHLORO-ETHANE	67-72-1	NIOSH 1003	0.12	10	CT 100/50	3L@1ppm-70L	0.01-0.2	ST 226-01	S
1,6-HEXAMETHYLENE DIISOCYANATE (HDI)	822-06-0	OSHA 42	0.13	0.35	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters. Sample open faced.	N P
		OSHA 18 (Modified)	0.10	0.35				Call lab for sampler	S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
HEXAMETHYLENE DIISOCYANATE BIURET (HDIB)	4035-89-6	OSHA 47	0.13	1.1	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters. Sample open faced.	N
n-HEXANE	110-54-3	NIOSH 1500 & OSHA 7	0.062	10	CT 100/50	4L	0.01-0.2	ST 226-01	ALL
2-HEXANONE (METHYL-n-BUTYL KETONE MBK)	591-78-6	NIOSH 1300 & OSHA 7	0.068	20	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
HEXONE (METHYL ISOBUTYL KETONE MIBK)	108-10-1	NIOSH 1300 & OSHA 7	0.064	20	CT 100/50	1L-10L	0.01-0.2	ST 226-01	ALL
HYDRAZINE	302-01-2	NIOSH 3503	0.094	0.9	IMPINGER (0.1N HCl)	7L@1.3mg/m^3-100L	0.2-1.0	15ml 0.1N HCl; Ship in glass vial (Supelco #2-3297)	N S
		OSHA 20	0.055	0.13	FIREBRICK COATED (300mg)	20L	0.1	ST 226-42-02	N
HYDROGEN CHLORIDE	7647-01-0							(See ACIDS)	
HYDROGEN FLUORIDE	7664-39-3							(See ACIDS)	
HYDROGEN SULFIDE	7783-06-4	NIOSH 6013	0.059	11	CT 400/200	1.2L-40L	0.1-1.5 recommed 0.2L	Supelco Orbo 34	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
HYDROGENATED MDI (HMDI)	5124-30-1	OSHA 47	lab detn	0.7	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters. Sample open faced. Note: HMDI is not HDI.	N
HYDRO-QUINONE	123-31-9	NIOSH 5004	0.061	10	0.8 MCEF	30@2mg/m^3-180L	1-3	FLT 225-5 Ship filter in 10ml 1% aq Acetic Acid; ship in glass vial.	ALL
IODINE	7553-56-2	NIOSH 6005	0.085	1	TREATED CT	15L@0.05ppm-225L	0.5-1.0	ST 226-67	N
IRON FUME and particulate as Fe	1309-37-1	NIOSH 7300 & OSHA 121	0.068	1	0.8 MCEF	480L	1-2	FLT 225-5	ALL
ISOPHORONE	78-59-1	NIOSH 2508	0.05	20	CT 100/50	2L-25L	0.01-1.0	ST 226-38 (Charcoal Petroleum base tubes)	N S
ISOPHORONE DIISOCYANATE	4098-71-9	OSHA 42 OSHA 18 (modified)	0.12	0.3	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters. Sample open faced.	N S
JP-4		NIOSH 1550 & OSHA 48	0.086	75	CT 100/50	3L	0.01-0.2	ST 226-01 Provide 1ml bulk	ALL
JP-5		NIOSH 1550 & OSHA 48	0.086	75	CT 100/50	3L	0.01-0.2	ST 226-01 Provide 1ml bulk	ALL
JP-8		NIOSH 1550 & NEPMU-2 INHOUSE	0.086	75	CT 100/50	3L	0.01-0.2	ST 226-01 Provide 1ml bulk	N S
KEROSENE								(See NAPHTHAS)	

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
LEAD and inorganic compounds as Pb	7439-92-1	NIOSH 7082	0.072	2	0.8 MCEF	200L@0.05mg/m^3-1200L	1-4	FLT 225-5	P S
		NIOSH 7300 & OSHA 125	0.060	7	0.8 MCEF	400L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
LIGROINE		OSHA 48	0.069	3	CT 100/50	3L	0.01-0.2	ST 226-01 Provide 5ml bulk	S
D-LIMONENE	5989-27-5	NEPMU-2 INHOUSE	0.10	10	CT 100/50	10L	0.05-0.2	ST 226-01	N
LITHIUM (Li)	7439-93-2	NIOSH 7300 & OSHA 125	0.10	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
MAGNESIUM OXIDE FUME as Mg	1309-48-4	OSHA 121	0.073	1	0.8 MCEF	480L	1-2	FLT 225-5	ALL
		NIOSH 7300 & OSHA 125	0.084	1	0.8 MCEF	50L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
MALATHION	121-75-5	OSHA 62	0.078	1.8	Special collection device	60L	1-2	ST 226-30-16 or OVS-2 from Foresst Biomedical	ALL
MANGANESE (Mn)	7439-96-5	OSHA 121	0.094	1	0.8 MCEF	480L	1-2	FLT 225-5	P S
		NIOSH 7300 & OSHA 125	0.082	0.5	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
MERCURY (Hg) VAPOR as Hg	7439-97-6	OSHA 140	0.089	0.03	PASSIVE BADGE	10L	0.02	SKC #520-02A (Badge) & 520-03 (Holder)	N
		NIOSH 6009	0.089	0.03	HOPCALITE 2OO mg	2L@0.05mg/m^3-100L	0.15-0.25	ST 226-17-1A Send two unexposed for blanks	ALL
MESITYL OXIDE	141-79-7	NIOSH 1301	0.071	50	CT 100/50	1L-25L	0.01-0.2	ST 226-01	S
METAL SCREEN (Pb, Fe, Cr, Zn, Cd, Mn, Co, V Cu, Ni, Be, Mo, Sb)		NIOSH 7300 & OSHA 125 (ICP scans)	lab detn	lab detn	0.8 MCEF	400L	1-4 if Lab uses NIOSH method; 2 if OSHA.	Call LAB to determine if NIOSH or OSHA method is used for analsis. The method will determine your sampling rate.	ALL
METHANOL (METHYL-ALCOHOL)	67-56-1	NIOSH 2000	0.063	10	SG 100/50	1L@200ppm-5L	0.02-0.2	ST 226-51 Not compatible with other organics. Use larger tubes when high quantities of MeOH suspected	ALL
2-METHOXY-ETHANOL (METHYL CELLOSOLVE)	109-86-4	NIOSH 1403	0.068	20	CT 100/50	1L-10L	0.01-0.5	ST 226-01 Not compatible with other organics. Store in FREEZER	ALL
		OSHA 79	0.080	1	CT 100/50	15L-48L	0.1-1.0 (1.0 L for STEL)	ST 226-01 Not compatible with other organics. Store in FREEZER	ALL
2-METHOXY-ETHYL ACETATE (METHYL CELLOSOLVE ACETATE)	109-49-6	NIOSH 1403	0.078	10	CT 100/50	1L-10L	0.01-0.5	ST 226-01 Not compatible with other organics. Store in FREEZER	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
		OSHA 79	0.079	1	CT 100/50	15L-48L	0.1-1.0 (1.0 L for STEL)	ST 226-01 Not compatible with other organics. Store in FREEZER	ALL
METHYL-ACETATE	79-20-9	OSHA 7	0.055	10	CT 100/50	5L	0.01-0.2	ST 226-01	N S
METHYL-CHLOROFORM (111-TRICHLORO-ETHANE)	71-55-6	NIOSH 1003 & OSHA 7	0.054	10	CT 100/50	0.1L@350ppm-8L	0.01-0.2	ST 226-01	ALL
METHYL ETHYL KETONE (MEK)	78-93-3							(See 2-BUTANONE)	
METHYL ETHYL KETONE PEROXIDE (MEKP)	1338-23-4	OSHA 77 (MODIFIED)	0.087	4.5	XAD-4 80/40	15L	1	ST 226-30-11-04 Ship refrigerated or on dry ice	N
METHYL IODIDE	74-88-4	NIOSH 1014	0.070	10	CT 100/50	15-50L	0.01-1.0	ST 226-01	N
METHYL ISOBUTYL KETONE (MIBK)	108-10-1							(See HEXONE)	
METHYL METHACRYLATE	80-62-6	NIOSH 2537	0.063	10	XAD-2 400/200	1L@100PPM-8L	0.01-0.05	ST 226-30-06 Not compatible with other organics; Ship on dry ice.	N P
		OSHA 94	0.059	2	CT, TBC TREATED	3L	0.05	ST 226-73	N
METHYLAL	109-87-5	NIOSH 1611	0.060	10	CT 100/50	1-3L	0.01-0.2	ST 226-01	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
METHYLAMINE	74-89-5	OSHA 40	0.078	1	XAD-7 COATED 100/50	10L	0.2	ST 226-30-13-07	N S
METHYL-CYCLOHEXANE	108-87-2	NIOSH 1500 & OSHA 7	0.052	10	CT 100/50	4L	0.01-0.2	ST 226-01	S
4,4'-METHYLENE BIS (2-CHLOROANILINE) MOCA	101-14-4	NIOSH 236	0.10	1	13mmGFF + SG 50mg	20-50L	0.2-1.0	FLT 225-16 & ST 226-63	S
		OSHA 71	0.079	0.05	TREATED GFF	100-180L	1	FLT 225-9004 or Call LAB for filters. Transfer to vial w/ 2ml DI water.	N
4,4'-METHYLENE BIS PHENYL ISOCYANATE (MDI)	101-68-8	OSHA 47	0.063	0.30	TREATED 37mm GFF	15-240L	1	FLT 225-9002 or Call LAB for coated filters. Sample open faced.	N P
		OSHA 18 (modified)	0.10	0.30				Call lab for sampler	S
METHYLENE CHLORIDE (DICHLORO-METHANE)	75-09-2	NIOSH 1005	0.073	10	2 CT 100/50	0.5L@500ppm-2.5L	0.01-0.2	ST 226-01 Tubes in series; separate & cap, ship to LAB	ALL
		OSHA 59	0.081	2	2 CT 400/200	10L	0.05	ST 226-09	S
		OSHA 80	0.080	2	Anasorb CMS	0.25-3.0L	0.05	ST 226-121	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
4,4'-METHYLENE DIANILINE	101-77-9	OSHA 57	0.099	0.01	TREATED GFF	100L	1	FLT 225-9004 or call LAB for filters. Transfer to vial w/ 2ml DI water.	N
MINERAL OIL MIST (WATER INSOLUBLE OILS ONLY)	8012-95-1	NIOSH 5026	0.065	50	0.8 or 5.0 MCEF/PVC/ GFF	20L@5mg/m^3 -50L	1-2	FLT 225-5 Provide 5ml bulk oil, water insoluble	N P
MINERAL SPIRITS	8030-30-6							(See NAPHTHAS)	
MOLYBDENUM (Mo)	7439-98-7	OSHA 121	0.075	0.5	0.8 MCEF	480L	1-2	FLT 225-5	ALL
		NIOSH 7300 & OSHA 125	0.094	1	0.8 MCEF	50L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
MORPHOLINE	110-91-8	NIOSH S150	0.057	1.5	SG 150/75	20L	0.01-0.2	ST 226-10	ALL
NAPHTHALENE	91-20-3	OSHA 35	0.064	4	CHROMOSORB 106 100/50	10L	0.2	ST 226-49-60106	N S
NAPHTHAS (REFINED PETROLEUM SOLVENTS)	8030-30-6	NIOSH 1550 & OSHA 48	0.089	75	CT 100/50	1.3L@400mg /m^3-20L	0.01-0.2	ST 226-01 Provide 2ml bulk	ALL
NICKEL (Ni)	7440-02-0	NIOSH 7300 & OSHA 125	0.077	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
		OSHA 121	0.065	1	0.8 MCEF	480L	1-2	FLT 225-5	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
NITRIC ACID (HNO_3)	7697-37-2	NIOSH 7903	0.085	0.7	SG 400/200 or ORBO 53	50L-100L	0.2-0.5L	ST 226-10-03 or SUPELCO ORBO 53 (2-0265F); Send blanks	ALL
NITROGEN DIOXIDE	10102-44-0	OSHA 182	0.084	1	MOLECULAR SIEVE TUBE	3L	0.2	ST 226-40-02	N
NITROGEN DIOXIDE / NITRIC OXIDE (NO_X)	10102-44-0 / 10102-43-9	OSHA 182 or OSHA 190	0.084	1	MOLECULAR SIEVE TUBE	3L	0.01-0.025	ST 226-40	N S
NITRO-GLYCERIN	55-63-00	NIOSH 2507 & OSHA 43	0.068 0.104	0.20 0.60	TENAX 100/50	15L	1	ST 226-35-03	N
NITRO-METHANE	75-52-5	NIOSH 2527	0.078	0.3	CHROMOSORB 106 600/300	1.2-3.0L	0.01-0.5	Supelco Custom	N
1-NITROPROPANE	108-03-2	OSHA 46A	0.072	0.4	XAD-4 80/40	4L	0.01-0.1	ST 226-30-11-04	S
2-NITROPROPANE	79-46-9	OSHA 46B	0.062	0.4	XAD-4 80/40	4L	0.01-0.1	ST 226-30-11-04	S
NITROUS OXIDE	10024-97-2		0.063	1 ppm	PASSIVE DOSIMETER			Obtain from R.S. Landauer	N S
NITROUS OXIDE (FIELD IR METHOD)	10024-97-2	NIOSH 6600	0.063	1 ppm				Analyze in field using portable IR equipment.	FIELD
n-OCTANE	111-65-9	NIOSH 1500 & OSHA 7	0.06	10	CT 100/50	4L	0.01-0.2	ST 226-01	S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
ORGANIC VAPOR MONITOR 3M (PASSIVE MONITOR)		3M METHOD &OSHA 7	contact 3 M	contact 3M	3M Brand Monitor	2 -8 hours		3M OVM#3500	ALL
ORTHENE (ACEPHATE)	30560-19-1	OSHA INHOUSE	0.10	1	37mm GFF	250L	1	FLT 225-7	N
OZONE	10028-15-6	OSHA 214	0.062	1	2 TREATED GFF	45L	1	Call LAB for filters.	N
PENTACHLORO-PHENOL (PCP)	87-86-5	OSHA 39	0.069	0.33	GFF + (2) XAD-7 80/40	48L	0.01-0.2	ST 226-30-11-07 & FLT 225-7	ALL
n-PENTANE	109-66-0	NIOSH 1500 & OSHA 7	0.064	10	CT 100/50	2L	0.01-0.05	ST 226-01	ALL
2-PENTANONE (METHYL PROPYL KETONE)	107-87-9	NIOSH 1300 & OSHA 7	0.063	20	CT 100/50	1L-10L	0.01-0.2	ST 226-01	P S
PERCHLORO-ETHYLENE	127-18-4							(See TETRACHLORO-THYLENE)	
PESTICIDES								Call LAB for info	ALL
PETROLEUM ETHER	8032-32-4							(See NAPHTHAS)	
PHENOL	108-95-2	OSHA 32	0.055	1	XAD-7 100/50	24L	0.01-0.1	ST 226-30-12-07 Not compatible with other organics.	ALL
PHENYL GLYCIDYL ETHER	122-60-1	NIOSH 1619	0.057	10	CT 100/50	80L@1ppm-150L	0.01-1.0	ST 226-01	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
PHOSPHORIC ACID	7664-38-2	OSHA 111	0.067	2	0.8 MCEF	100L-400L	0.2-2.0	FLT 225-5 Transfer and ship in glass vial	ALL
		NIOSH 7903	0.067	2	SG 400/200	50-100L	0.2-0.5	ST 226-10-03	S
POLYCHLORO-BIPHENYLS (PCBs or AROCLORS)	53469-21-9 11097-69-1	NIOSH 5503	0.094	0.03	GFF + FLORISIL 100/50	1L@0.5mg/m^3-50L	0.05-0.2	FLT 225-16 & ST 226-39 Ship in glass vials; Provide 1ml bulk	ALL
POLYNUCLEAR AROMATIC HYDROCARBONS (PNAH)		OSHA 58 (MODIFIED)	0.08	0.2	PTFE	960L	2	FLT 225-17-07 Ship immediately in Al foil wrapped glass vial.	N
		NIOSH 5506	0.090	0.2	PFTE + XAD2 150/75	200L-1000L	2	FLT 225-17-07 & ST 226-30-05 Ship immediately in Al foil wrapped glass vial.	P S
POTASSIUM (K)	7440-09-7	OSHA 121	0.063	1	0.8 MCEF	480L	1-2	FLT 225-5	ALL
n-PROPYLACETATE	109-60-4	NIOSH 1450 & OSHA 7	0.068	20	CT 100/50	1L-10L	0.01-0.2	ST 226-01	N S
iso-PROPYLACETATE	108-21-4	OSHA 7	0.068	20	CT 100/50	10L	0.01-0.2	ST 226-01	N S
iso-PROPYLALCOHOL	67-63-0	NIOSH 1400 & OSHA 7	0.064	10	CT 100/50	0.2L-3L	0.01-0.2	ST 226-01 Not com-patible with other organics.REFRIGERATE in storage.	P S

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
n-PROPYLALCOHOL	71-23-8	NIOSH 1401& OSHA 7	0.053	10	CT 100/50	1L-10L	0.01-0.2	ST 226-01 Not compatible with other organics. REFRIGERATE in storage.	ALL
PROPYLENE GLYCOL DINITRATE (PGDN, OTTO FUEL)	6423-43-4	NIOSH 2507 (MODIFIED)	0.090	1	TENAX 100/50	2L@0.05mg/m^3- 10L	0.2-1.0	ST 226-35-03 2 BLANKS NEEDED	ALL
PROPYLENE GLYCOL MONOMETHYL ETHER	107-98-2	OSHA 99	0.053	1	CT 100/50	3-10	0.05-0.2 0.2L for 15 min STEL	ST 226-01	N
PROPYLENE GLYCOL MONOMETHYL ETHER ACETATE	108-65-6	OSHA 99	0.053	1	CT 100/50	3-10	0.05-0.2 0.2L for 15 min STEL	ST 226-01	N
PYRETHRUM	8003-34-7	OSHA 70	0.065	0.01	SPECIAL COLLECTION DEVICE	60L	1	ST 226-30-16 or OVS-2 from Forest Biomedical	N P
PYRIDINE	110-86-1	NIOSH 1613	0.059	20	CT 100/50	18-150L	0.01-1.0	ST 226-01, Not compatible with other organics.	N S
RDX (CYCLONITE)	121-82-4	OSHA INHOUSE	0.10	1	GFF	960L	2	FLT 225-7	N
ROUNDUP	38641-94-0	OSHA INHOUSE	0.10	1	GFF	100L	1	FLT 225-7	N

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
SAFROTIN		OSHA INHOUSE	0.10	1	GFF	60L	1	FLT 225-7	N
SELENIUM COMPOUNDS AS (Se)	7782-49-2	NIOSH 7300 & OSHA 125	0.122	1	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N S
SEVIN (CARBARYL)	63-25-22	OSHA 63	0.053	1.7	SPECIAL COLLECTION DEVICE	60L	1	ST 226-30-16 or OVS-2 from Forest Biomedical	N P
SILICA (CRYSTALLINE, RESPIRABLE)		OSHA ID142	0.10	5	5um PVC + CYCLONE	400L@.05mg /m^3- 1000L	1.7	FLT 225-8-01, CALL LAB FOR MORE INFO Sample must be Respirable Fraction	P
SILVER and soluble compounds as Ag	7440-22-4	NIOSH 7300 & OSHA 125	0.070	1	0.8 MCEF	250L	1-4 if Lab uses NIOSH method; 2 if OSHA.	FLT 225-5	N
		OSHA 121	0.05	1	0.8 MCEF	480L	1-2	FLT 225-5	P S
SODIUM (Na)	7440-23-5	OSHA 121	0.05	1	0.8 MCEF	480L	1-2	FLT 225-5	ALL
SODIUM HYDROXIDE	1310-73-2	OSHA 121 (MODIFIED)	0.05	1	1.0 PTFE	13L-200L	1-4	FLT 225-17-01 (These filters have low Na background)	ALL
STODDARD SOLVENT (PD-680)	8052-41-3							(See NAPHTHAS)	
STYRENE (MONOMER)	100-42-5	NIOSH 1501	0.058	10	CT 100/50	5L-14L	0.1-1.0	ST 226-01	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
SULFUR DIOXIDE	7446-09-5	OSHA 104	0.092	3	MCEF + BUBBLER	15L-60L	1	10-15 ml of 0.3N hydrogen peroxide	N
		OSHA 200	0.098	0.5	ANASORB 747	1.5-12L	0.1	ST 226-80	N
SULFURIC ACID	7664-93-9	OSHA 113	0.087	0.9	0.8 MCEF	480L	1-3	FLT 225-5 Remove filter and ship in glass vial.	ALL
		NIOSH 7903	0.087	0.9	SG 400/200	50L-100L	0.2-0.5	ST 226-10-03	S
TETRACHLORO-ETHYLENE (PERCHLORO-ETHYLENE)	127-18-4	NIOSH 1003 & OSHA 7	0.052	10	CT 100/50	0.2L@100ppm-40L	0.01-0.2	ST 226-01	ALL
TETRAETHYL LEAD (as Pb)	78-00-2	OSHA INHOUSE	0.097	2	GFF +CT 100/50	180L	0.75	FLT 225-7 & ST 226-01	N P
THIONYL-CHLORIDE	7719-09-7	OSHA 174SG	0.059	1	BUBBLER	15L	1	15ml of DI WATER - SEND 50ml of UNEX-POSED DI WATER	N
TIN (INORGANIC COMPOUNDS) as Sn	7440-31-5	OSHA 206 & OSHA 125	0.093	1	0.8 MCEF	100L	1-4	FLT 225-5	N
		OSHA 121	0.079	20	0.8 MCEF	480L	1-2	FLT 225-5	ALL
TIN (ORGANOTIN COMPOUNDS) as Sn	7440-31-5	M & T PAINT Company	0.10	1	GFF + XAD-2 80/40	50L-500L	1.0-1.5	FLT 225-7& ST 226-30	ALL

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)	SPECIAL INSTRUCTIONS	LAB
TITANIUM DIOXIDE	13463-67-7	NIOSH 0500	0.056	0.03	TARED PVC	100L	2	FLT 225-8-01, Preweighed filter required or 225-8202 (Matched wt)	N
TOLUENE	108-88-3	NIOSH 1500/1501 & OSHA 7	0.052	10	CT 100/50	2L-8L	0.01-0.2	ST 226-01	ALL
TOLUENE-2,4-DIISOCYANATE (2,4-TDI)	584-84-9	OSHA 42 & OSHA 18 (modified)	0.135	1.3	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters Sample open faced	ALL
TOLUENE-2,6-DIISOCYANATE (2,6 TDI)	91-08-7	OSHA 42 & OSHA 18 (modified)	0.145	1.6	TREATED 37mm GFF	15L-240L	1	FLT 225-9002 or Call LAB for coated filters Sample open faced.	ALL
TRIBROMO-METHANE	75-25-2							(See BROMOFORM)	
112-TRICHLORO-122-TRIFLUORO-ETHANE (REFRIGERANT 113)	76-13-1	NIOSH 1020	0.07	5	CT 100/50	0.1L@1000ppm - 3 L	0.01-0.05	ST 226-01, REFRIGERATE Shipment to LAB	ALL
1,1,2-TRICHLORO-ETHANE	79-00-5	NIOSH 1003 & OSHA 7	0.057	10	CT 100/50	2L@10ppm-60L	0.01-0.2	ST 226-01	ALL
1,1,1-TRICHLORO-ETHANE	71-55-6							(See METHYL CHLOROFORM)	

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)
TRICHLORO-ETHYLENE	79-01-6	NIOSH 1022 & OSHA 7	0.082	10	CT 100/50	1L@100ppm-30L	0.01-0.2
1,2,3-TRICHLORO-PROPANE	96-18-4	NIOSH 1003 & OSHA 7	0.068	10	CT 100/50	0.6L@50ppm-60L	0.01-0.2
2,4,6-TRINITRO-TOLUENE (TNT)	118-96-7	OSHA 44	0.161	1.2	GFF+TENAX (100/50)	40L-80L	0.1-1.0
TRIPHENYL PHOSPHATE	115-86-6	NIOSH 5038	0.066	10	0.8 MCEF	10L@3mg/m^3-400L	1-3
TRIORTHO-CRESYL PHOSPHATE (TOCP)	78-30-8	NIOSH S209	0.086	0.1	0.8 MCEF	100L	<1.5
TUNGSTEN (W)	7440-33-7	OSHA 213	0.10	1	0.8 MCEF	100L	2
TURPENTINE	8006-64-2	NIOSH 1551	0.055	10	CT 100/50	1L@560mg/m^3-10L	0.01-0.2
VM&P NAPHTHA	8032-32-4						
VANADIUM FUME & DUST as V	1314-62-1	OSHA 121	0.095	0.5	0.8 MCEF	480L	1-2
		NIOSH 7300 & OSHA 125	0.095	0.5	0.8 MCEF	200L	1-4 if Lab uses NIOSH method; 2 if OSHA.
VINYLACETATE	108-05-4	OSHA 51	0.058	1	AMBERSORB XE 347	24L	0.1
VINYL-CHLORIDE (MONOMER)	75-01-4	NIOSH 1007	0.06	0.04	2CT 100/50	0.7-5.0L	0.05
VINYLIDENE CHLORIDE	75-35-4	OSHA INHOUSE	0.10	10	CT 100/50	3L	0.2
XYLENE-DIAMINE	1477-55-0	OSHA 105	lab detn	lab detn	2 Treated GFF	15-100L	1
o,m,p-XYLENES	1330-20-7	NIOSH 1501 & OSHA 7	0.060	10	CT 100/50	12L-23L	0.01-0.2

ANALYTE / SUBSTANCE	CAS NO.	METHOD	CV	LOD (in ug)	SAMPLING MEDIA	RECOMMENDED AIR VOLUME (Liters)	SAMPLING RATE (LPM)
ZINC and compounds as Zn	7440-66-6	OSHA 121	0.089	0.1	0.8 MCEF	480L	1-2
		NIOSH 7300 & OSHA 125	0.057	0.05	0.8 MCEF	100L	1-4 if Lab uses NIOSH method; 2 if OSHA.
ZINC CHROMATE	13530-65-9						

INDEX BY SUBSTANCE

(SEE NAPHTHAS)

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CYCLOHEXANE	29	110827
CYCLOHEXENE	29	110838
PYRIDINE	48	110861
MORPHOLINE	44	110918
ETHOXYETHYLACETATE (2-) (or CELLOSOLVE ACETATE)	32	111159
GLUTARALDEHYDE	36	111308
DIETHYLENETRIAMINE	31	111400
OCTANE (n-)	45	111659
BUTOXYETHANOL (2-) (or BUTYLCELLOSOLVE)	25	111762
BUTYLCELLOSOLVE ACETATE	26	112072
BAYGON (or PROPOXUR)	24	114261
TRIPHENYL PHOSPHATE	51	115866
DIOCTYL PHTHALATE	31	117840
TRINITROTOLUENE (or TNT)	51	118967
MALATHION	40	121755
RDX (or CYCLONITE)	48	121824
PHENYL GLYCIDYL ETHER	46	122601
HYDROQUINONE	38	123319
DIACETONE ALCOHOL	30	123422
AMYL ALCOHOL (iso)	23	123513
BUTYL ACETATE (n)	25	123864
DIOXANE (p-) (or 1,4 DIETHYLENE DIOXIDE)	31	123911
AMYL ACETATE (iso)	23	123922
TETRACHLOROETHYLENE (or PERCHLOROETHYLENE)	49	127184
DIMETHYLACETAMIDE	31	127195
ETHYL ACRYLATE	33	140885
AMINOETHANOL	22	141435
ETHYL ACETATE	33	141786
MESITYL OXIDE	40	141797
HEPTANE (n-)	37	142825
HALOTHANE (or FLUOTHANE)	36	151677
HYDRAZINE	38	302012
ALDRIN	22	309002
DIAZINON	30	333415
DICHLOROETHYLENE (1,2)	30	540590
BUTYL ACETATE (tert)	25	540885
NITROGYCERIN	44	556300
TOLUENE DIISOCYANATE (2,4-) (or 2,4-TDI)	50	584849
HEXANONE (2-) (or METHYL-N-BUTYL KETONE)	37	591786
METHYL ISOCYANATE	42	624839
AMYL ACETATE (sec)	23	626380
AMYL ACETATE (n)	23	628637
ETHYLENE GLYCOL DINITRATE	34	628966
SEVIN (or CARBARYL)	48	632522
ETHYL-3-ETHOXYPROPIONATE	34	763699

ORTHENE (or ACEPHATE)	45	30560191
DIPROPYLENE GLYCOL METHYL ETHER	31	34590948
ROUNDUP	48	38641940
COAL TAR PITCH VOLATILES (SEE PNAH)	46	65996932
COAL DUST	28	68131748

INDUSTRIAL HYGIENE AIR SAMPLE SURVEY FORM NEHC 5100/13

INDUSTRIAL HYGIENE AIR SAMPLE SURVEY FORM NEHC 5100/13

This form is used to record information collected while sampling with air sampling pumps and passive monitors. Analytical information is provided by the laboratory. As many as 5 stressors may be listed on each form, but only 1 worker.

Front Side

TO
The address of the consolidated industrial hygiene laboratory to which the sample is being sent.

FROM
The complete address of the command requesting the sample analysis.

POC
The industrial hygienist to contact in case there are questions concerning the sample(s).

PHONE
The complete commercial and DSN phone numbers of the POC.

FAX
The fax number of the POC.

DATE
The date the samples were collected.

IH UIC
The Unit Identification Code (UIC) of the command providing industrial hygiene support.

ACTIVITY
The name of the command receiving industrial hygiene support.

UIC
The Unit Identification Code of the command receiving industrial hygiene support.

BUILDING/ LOCATION
The building or hull number where the samples are being collected.

WORKSITE
The location inside the building or ship where the samples are being collected.

SHOP/CODE
The name and/or number of the shop where the employee being sampled works.

SAMPLE COLLECTION TYPE
Check the appropriate box.

EMPLOYEE SAMPLED: NAME
The complete name of the employee sampled.

SSN/BADGE #
The last 4 digits of the social security number or the badge number of the employee sampled.

JOB TITLE
Job title of individual sampled.

(M)IL OR (C)IV
Is individual sampled military or civilian?

OPERATION
A brief description of the operation performed during the sample period. (e.g. not 'painting' but 'spray painting ship's hull'.)

CODE

The operation code which most closely matches the operation being evaluated. Operation codes are found in the Industrial Hygiene Information Management System (IHIMS) manual.

TASK
Further defines the operation

SHIFT
Use number codes
1 = Day
2 = Evening
3 = Night

FREQUENCY OF OPERATION
Use number codes
1 = Daily
2 = 2-3 Times/Week
3 = Weekly
4 = 2-3 Times/Month
5 = Monthly
6 = 2-3 Times/Year
7 = Yearly
8 = Special Occasions

DURATION OF OPERATION
Use number codes
1 = <1 Hour (<60 minutes)
2 = 1-4 Hours (60-240 minutes)
3 = 4-8 Hours (240-480 minutes)
4 = >8 Hours (>480 minutes)

RESPIRATOR
A description of the respirator being used by the employee, to include manufacturer, model, type of cartridge, etc. If no respirator is in use, state 'none'.

CODE
The NIOSH/MSHA approval number for the respirator used.

PPE
A description of any personal protective equipment in use during the sample period.

CODE(S)

The code(s) of the personal protective equipment in use. PPE codes are in Appendix 3-C.

PRODUCT USED
A description of the product containing the stressor (e.g., welding rod, spray paint, degreaser, etc.).

VENTILATION
From the following list, select the most closely matching ventilation type:
a. Natural
b. General
c. Small Booth
d. Large Booth, non walk-in
e. Large Booth, walk-in
f. Canopy Hood
g. Glove Box
h. Laboratory Hood
i. Free Hanging
j. Lateral Slot
k. Push-Pull
l. Downdraft
m. Metal working/wood working
n. Low Volume-High Velocity

MEETS SPECS
Based on measurements, does the ventilation meet specifications? "Y" for yes; "N" for no; "U" for unknown

USED
Is the ventilation system used?
"Y" for yes; "N" for no.

UNSAMPLED PERIOD
Check the appropriate box.

DURATION
The duration of the sample, in minutes (calculated from pump 'on' and 'off' times).

FLOW RATE
The flow rate of the sampling pump, or the equivalent flowrate of the passive monitor, in liters per minute.

VOLUME
The total volume of air collected, in liters.

SAMPLE #
The unique number used to identify the sample.

LABORATORY #
The number used by the lab to identify and track the sample.

STRESSOR/CAS #
The stressor being sampled and the Chemical Abstracts Service Registry Number. A list of stressors with exposure standards is in the IHIMS manual.

LOD
The limit of detection of the analytical method, to be provided by the laboratory.

RESULTS/UNITS
The result of analysis expressed as a concentration, in mg/m^3 or fibers/cc. This is a time weighted average for the time sampled.

8 HR TWA
The calculated 8 hour time weighted average(s) of the stressor(s). To be calculated by the sample taker.

DATE RECEIVED
The date the sample was received by the laboratory.

ANALYTICAL METHOD
The method used by the laboratory to analyze the sample.

COMMENTS
Explanatory comments by the chemist about the sample or analysis.

ANALYSIS PERFORMED BY
The name and signature of the chemist performing the analysis.

DATE ANALYZED
The date the sample was analyzed.

ANALYSIS REVIEWED BY
Name and signature of the reviewing supervisor

DATE REPORTED
The date the laboratory reported the results.

Reverse Side

FIELD SAMPLE ID
The number used to identify the sample in the field.

MEDIA
The type of media used to collect the sample (e.g., MCEF, CT, 3M 3500 OVM).

LOT/TUBE #
The manufacturer's lot or tube number for the media.

EXPIRATION DATE
The expiration date of the media, if any.

TIME OFF
The time the sampling period ended.

TIME ON
The time the sampling period began.

PUMP CHECK(S)
The time(s) when the pump was checked to ensure proper operation.

COLLECTION INSTRUMENT
The manufacturer, model, type and serial number of the sampling pump.

CALIBRATOR
The manufacturer, model, type and serial number of the calibration device.

PRE CALIBRATION DATE
The date the sample pump was pre calibrated. Must be the same date as post calibration and sample date unless sampling across the midnight hour.

PRE CALIBRATION FLOW RATE
The average flow rate during pump pre calibration.

POST CALIBRATION DATE

The date the sample pump was post calibrated. Must be the same as the pre cal date and sample date unless sampling across the midnight hour.

POST CALIBRATION FLOW RATE
The average flow rate during pump post calibration.

CALIBRATED BY
The printed name and signature of the person performing the calibration.

LOWER FLOW RATE
The lower of the pre and post pump calibration flow rates. This flow rate is to be used when calculating sample volume. The difference between pre and post calibration values should not exceed 5% when calculated by the equation:

$$\frac{\text{High Value - Low Value}}{\text{Low Value}} \text{ X } 100 = \text{ \% Error}$$

For passive monitors, enter the manufacturer's listed equivalent flow rate.

CALCULATIONS
Any calculations associated with the calibration or sample results.

TIME COURSE OF EVENTS/COMMENTS
A detailed chronological description of the operation and any other comments or observations.

IHT/WPM
The printed name and signature of the industrial hygiene technician or workplace monitor performing the sampling.

DATE
The date the form was signed.

IH
The printed name and signature of the industrial hygienist performing the sampling or reviewing the sample form.

DATE
The date the form was signed.

INDUSTRIAL HYGIENE BULK/WIPE SAMPLING FORM NEHC 5100/16

This form is used to record data collected during bulk or wipe samples.

TO
The address of the consolidated industrial hygiene laboratory performing the analysis.

FROM
The complete address of the command requesting the sample analysis.

POC
The industrial hygienist to contact in case there are questions concerning the sample(s).

PHONE
The complete commercial and DSN phone numbers of the POC.

DATE
The date the samples were collected.

IH UIC
The Unit Identification Code of the command providing industrial hygiene support.

ACTIVITY
The name of the command receiving industrial hygiene support.

UIC

The Unit Identification Code of the command receiving industrial hygiene support.

BUILDING/LOCATION
The building or hull number where the samples are being collected.

WORKSITE
The location inside the building or ship where the samples are being collected.

SHOP/CODE
The name and/or number of the shop where the sample was collected.

SAMPLE CLASS
Check the appropriate box.

ASSOCIATED AIR SAMPLES
List the sample numbers of any air samples taken in conjunction with the bulk/wipe sample.

COLLECTION MEDIA
Describe the media used to collect the sample, if applicable.

FIELD ID
The number/name used to identify the sample in the field.

SOURCE
Describe where the sample originated (e.g., pipe lagging, solvent tank, etc.).

SAMPLE #
The number used to identify the sample to the laboratory.

LABORATORY #
The number used by the lab to identify and track the sample.

SUSPECTED STRESSOR
List the stressor(s) expected to be found in the bulk/wipe sample.

ANALYSIS
The stressor(s) identified by the laboratory.

RESULTS/UNITS
The quantity of stressor identified in a unit of measure or a percentage, if appropriate.

DATE RECEIVED
The date the sample was received by the laboratory.

ANALYTICAL METHOD
The method used by the laboratory to analyze the sample.

COMMENTS
Explanatory comments by the chemist about the sample or analysis.

LOD
The limit of detection for the analytical method, to be provided by the laboratory.

ANALYSIS PERFORMED BY
The name and signature of the chemist performing the analysis.

DATE ANALYZED
The date the sample was analyzed.

ANALYSIS REVIEWED BY
Name and signature of the reviewing supervisor.

DATE REPORTED
The date the laboratory reported the results.

IHT/WPM
The printed name and signature of the industrial hygiene technician or workplace monitor performing the sampling.

DATE
The date the form was signed.

IH
The printed name and signature of the industrial hygienist performing the sampling or reviewing the sample form.

DATE
The date the form was signed.